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**3GPP2 A.S0016-0**

**Version 2.0**

**Date: May 2002**



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# **Interoperability Specification (IOS) for cdma2000 Access Network Interfaces — Part 6 (A8 and A9 Interfaces)**

**(3G-IOSv4.2)**

**(Post SDO Ballot, Pre SDO Publication Version)**

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# Foreword

(This foreword is not part of this standard.)

This document was produced by Working Groups TR45.4 of the Telecommunications Industry Association and TSG-A of the Third Generation Partnership Project 2. This document was developed in accordance with TIA/EIA and 3GPP2 procedural guidelines, and represents the consensus position of the Working Groups.

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## 1.0 Introduction

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### 1.1 Overview

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This document contains the message procedures, bitmaps, information elements and timers used to define the interfaces for the A8 and A9 interfaces.

#### 1.1.1 Purpose

---

The purpose is to provide the standard for interfacing a PCF with one or more BSs. This document defines the functional capabilities, including services and features, of the specified interface. These services and features are the defining characteristics that are the basis for the overall system standard.

#### 1.1.2 Scope

---

This standard provides the specification for the Interface which coincides with the Reference Point “A<sub>quinter</sub>” defined in the TR45 Network Reference Model shown in [23]. The scope of this standard includes the following topics:

- Descriptions of the specified functional capabilities that provide packet data services across the BS-PCF interface;
- Descriptions of the division of responsibility of the functions provided between the BS and the PCF without prescribing specific implementations.

## 1.2 References

---

### 1.2.1 TIA / EIA

---

For ease of cross referencing, the Telecommunications Industry Association (TIA) / Electronics Industry Association (EIA) references provided in this section are aligned with the 3GPP2 references, provided in section 1.2.2.

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- 20 [22] TIA/EIA/TSB58-D, Administration of Parameter Value Assignments for  
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- 22 [23] TIA/EIA/TSB100-A, Wireless Network Reference Model, March, 2001.

## 23 1.2.2 3GPP2

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24 The 3GPP2 references are aligned with the TIA/EIA references of Section 1.2.1 and are  
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## 1.3 Terminology

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### 1.3.1 Acronyms

---

| <b>Acronym</b> | <b>Meaning</b>  |
|----------------|---|
| 3GPP2          | Third Generation Partnership Project 2                    |
| ADDS           | Application Data Delivery Service                         |
| AMPS           | Advanced Mobile Phone System                              |
| BS             | Base Station  |
| BSC            | Base Station Controller                                   |
| CCPD           | Common Channel Packet Data                                |
| CDG            | CDMA Development Group                                    |
| CDMA           | Code Division Multiple Access                             |
| CLI            | Calling Line Identity                                     |
| CM             | Connection Management                                     |
| DRS            | Data Ready to Send  |
| EIA            | Electronics Industry Association                          |
| ESN            | Electronic Serial Number                                  |
| FPC            | Forward Power Control                                     |
| GRE            | Generic Routing Encapsulation                             |
| HO             | Hand Off  |
| IEI            | Information Element Identifier                            |
| IMSI           | International Mobile Subscriber Identity                  |
| IOS            | Interoperability Specification                            |
| IP             | Internet Protocol   |
| IS             | Interim Standard  |
| IWF            | Interworking Function                                     |
| LSB            | Least Significant Bit                                     |
| MIP            | Mobile Internet Protocol                                  |
| MS             | Mobile Station  |
| MSB            | Most Significant Bit                                      |
| MSC            | Mobile Switching Center                                   |
| NID            | Network Identification                                    |
| OAM&P          | Operations, Administration, Maintenance, and Provisioning |
| PACA           | Priority Access and Channel Assignment                    |
| PANID          | Previous Access Network Identifiers                       |

| <b>Acronym</b> | <b>Meaning</b>                          |
|----------------|---|
| PCF            | Packet Control Function                 |
| PDSN           | Packet Data Serving Node                |
| PLD            | Position Location Data                  |
| PZID           | Packet Zone Identifier                  |
| P-P            | PDSN-PDSN Interface                     |
| QoS            | Quality of Service                      |
| SCH            | Supplemental Channel                    |
| SDB            | Short Data Burst                        |
| SID            | System Identification                   |
| SMS            | Short Message Service                   |
| TCP            | Transmission Control Protocol           |
| TFO            | Tandem Free Operation                   |
| TIA            | Telecommunications Industry Association |
| TSB            | Telecommunications Systems Bulletin     |
| UZID           | User Zone ID                            |

1 **1.3.2 Definitions**

---

2 Reserved

3 **1.4 Message Body, Coding, and Ordering of Elements**

---

4 For each A9 Interface message there are a number of information elements that are  
 5 individually defined in section 4. Each information element in a given message is tagged  
 6 with a reference in section 4, a direction indication (i.e., some elements within a message  
 7 are bi-directional and others are not), and a mandatory/optional type (M/O) indicator.  
 8 Information elements that are marked as optional carry an additional indication of being  
 9 either required (R) or conditional (C) (see below). Some information elements are reused  
 10 in multiple messages.

11 The DIRECTION indication associated with each message element pertains to the use of  
 12 that particular message element when used with the particular message (i.e., use of the  
 13 message element may be different in other messages). The format of the DIRECTION  
 14 indication is as follows:

15 **Table 1.4-1 Element Flow DIRECTION Indication**

|           |                                      |
|-----------|--------------------------------------|
| BS -> PCF | Element flows from the BS to the PCF |
| PCF->BS   | Element flows from the PCF to the BS |

16 The inclusion of information elements in each message is specified as follows:

- 17 M Information elements which are mandatory for the message.
- 18 O Information elements which are optional for the message.
- 19 R Required in the message whenever the message is sent.
- 20 C Conditionally required. The conditions for inclusion of this element are  
 21 defined in the operation(s) where the message is used (refer to [13])

1 and in footnotes associated with the table defining the order of  
2 information elements in the message.

3 Information elements which are mandatory for a given message shall be present, and  
4 appear in the order shown in the message definitions in this chapter.

5 Information elements which are optional for a given message are included as needed for  
6 specific conditions. When included, they shall appear in the order shown in the message  
7 definition given in this chapter.

8 An information element can very well be mandatory for some messages and optional for  
9 other messages.

10 The bitmap tables in the message subsections of 3.0 are patterned after the format for  
11 the information elements of section 4 and use the following conventions:

12 ⇒ **Element Name**{<# instances>:  
13 = Name of information element.  
14 Different elements within a message are separated by  
15 double lines.  
16 Fields within elements are separated by single lines.  
17 Octets are renumbered at the beginning of every  
18 element.  
19 [<values>] = Set of allowed values.  
20 } **Element Name** The number of instances of an element is 1 by default.  
21 If the **Element Name**{<# instances ... }**Element**  
22 **Name** notation is used, the <# instances> notation  
23 indicates:  
24 n = exactly n occurrences of the element  
25 n+ = n or more occurrences of the element  
26 1..n = 1 to n inclusive occurrences of the element  
27 **label** {<# instances>:  
28 <octet 1>  
29 <octet m>  
30 } **label** = Number of instances of the bracketed set of fields  
31 where <# instances> notation indicates:  
32 n = exactly n occurrences of the field  
33 n+ = n or more occurrences of the field  
34 1..n = 1 to n inclusive occurrences of the field  
35 ssss ssss  
36 ••• = Variable length field.  
37 ssss ssss  
38

## 1.5 Forward Compatibility Guidelines

---

This standard is intended to accommodate new features and capabilities. To ensure that equipment implemented to one revision level interoperates with equipment implemented to later revision levels, the following guidelines are defined for the processing of messages and for the development of messages in future revisions of this standard.

Unexpected signaling information may be received at an entity due to differing levels of signaling protocol at different entities within a network: an entity using a more enhanced version of the protocol may send information to an entity implemented at a lower level of the protocol which is outside the protocol definition supported at that receiving entity.

It may happen that an entity receives unrecognized signaling information, i.e., messages, element types or element values. This can typically be caused by the upgrading of the protocol version used by other entities in the network. In these cases the following message processing guidelines are invoked to ensure predictable network behavior.

If the receiving entity is implemented to TIA/EIA/IS-2001 (IOS V4.0) or greater, then the sending entity shall send messages that are correctly formatted for the version of the IOS declared to be implemented by the sending entity.

## 1.6 Message Processing Guidelines

---

The following message processing guidelines apply unless overridden by explicit processing directions in other places within this standard.

In the guidelines in this section, “optional” includes both “optional – conditional” and “optional – required” information elements as indicated in the message tables in section 3.

1. If a message is received containing a Message Type value which is not defined for the revision level implemented then the message shall be discarded and ignored. There shall be no change in state or in timers due to receipt of an unknown message.
2. If a message is received without an expected mandatory information element for the revision level implemented then the message shall be discarded and ignored. There shall be no change in state or in timers due to receipt of the message.
3. If a message is received that contains an information element which is defined for the revision level implemented but contains invalid values in some fields, these fields shall be ignored and the remainder of the information element processed to the extent possible. The message and all other information elements shall be processed to the extent possible. Failure handling may be initiated if call processing cannot continue. Also refer to message processing guidelines 9 and 10 below.
4. If a message is received that contains an Information Element Identifier which is not defined for the revision level implemented then that element shall be discarded and ignored. The message shall be processed to the extent possible. Failure handling may be initiated if call processing cannot continue.
5. If a known but unexpected optional information element is received, that information element shall be ignored. The message and all other information elements shall be processed.

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6. If a message is received without an expected optional information element the message shall be processed to the extent possible. Failure handling may be initiated if call processing cannot continue.
- 4  
5  
6  
7  
8
7. If a field within a received information element contains a value that is specified as “reserved” or is otherwise not defined in the revision level implemented, this field shall be ignored and the remainder of the information element processed to the extent possible. In this situation, all other information elements in the message shall be processed to the extent possible.
- 9  
10  
11
8. Octets and bits designated as “Reserved” or which are undefined for the revision implemented shall be set to zero by a sending entity and ignored by a receiving entity.
- 12  
13  
14  
15
9. If an element is received containing a field that is larger than expected, i.e., is indicated as having more bits/octetes than expected, then the expected bits/octetes of that field shall be processed to the extent possible and the additional bits/octetes shall be ignored.
- 16  
17  
18  
19  
20
10. If an element is received containing a field that is smaller than expected, i.e., is indicated as having fewer bits/octetes than expected, then the length field or other indicator shall be considered correct and the bits/octetes actually present in the element shall be processed to the extent possible. Failure handling may be initiated if call processing cannot continue.

## 21 1.7 Message Definition Guidelines

---

- 22  
23
1. New messages shall have a Message Type that has never been previously used.
- 24  
25  
26  
27  
28  
29
2. Information Element Identifiers may be reused in future revisions only when:
- The old use of the element identifier is not used in the new revision, and
  - The new use of the element identifier is used only in new messages which were not defined in previous revisions.
  - The old use of the element identifier shall be supported within the context of the old messages in which it was used.
- 30  
31  
32
3. Defined valid values of Information Elements may be changed in future revisions. The new version shall define the error handling when previously valid values are received.
- 33  
34
4. Octets and bits which are undefined or which are defined as reserved may be used in future revisions.
- 35  
36
5. The Mandatory/Optional designation of Information Elements within a message shall not change.
- 37  
38
6. Mandatory Information elements shall be sent in the order specified in section 3.
- 39  
40
7. New optional Information Elements in a message shall be defined after all previously defined optional Information Elements.
- 41
8. All new Information Elements shall be defined with a length field.
- 42  
43
9. New information may be added to the end of an existing Information Element, provided that the Information Element is defined with a length field.
- 44

1  
2  
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## 2.0 Message Procedures

---

### 2.1 A8/A9 Interface Setup Procedures And Messages

---

This section contains the messages used to set up an A8 connection.

#### 2.1.1 A9-Setup-A8

---

This message is sent from the BS to the PCF to initiate the establishment of an A10 connection and to set up an A8 connection (if required).

##### 2.1.1.1 Successful Operation

---

When the BS receives an Assignment Request from the MSC, as a result of sending a CM Service Request (in response to an Origination Message from the mobile with a Service Option that requests packet data service and with the DRS bit set to 1), or as a result of sending a Paging Response, it initiates the procedure for establishing radio traffic channels. After establishing traffic channels, the BS determines the characteristics for an A8 connection such as QoS and generates an A9-Setup-A8 message indicating the normal call setup (i.e., the handoff indicator field of the A9-Setup-A8 message is set to '0'). The BS sends the message to the PCF on the A9 interface and starts timer  $T_{A8-Setup}$ . Upon receiving the message, the PCF initiates the procedure for establishing an A10 connection.

After establishing an A10 connection, the PCF sends an A9-Connect-A8 message to the BS.

When the mobile station performs a hard handoff during packet data services, the target BS sends the A9-Setup-A8 message upon receipt of the Handoff Request message from the MSC and starts timer  $T_{A8-Setup}$ . In this case, the BS sets the Handoff Indicator field of the A9-Setup-A8 message to '1' and Data Ready Indicator is set to '1'.

In the case of dormant handoff the BS sends the A9-Setup-A8 message to the PCF upon receipt of the Assignment Request from the MSC as a result of sending a CM Service Request (in response to an Origination message from the mobile with a Service Option that requests packet data service and with the DRS bit set to '0'). The BS sets both the Data Ready Indicator and the Handoff Indicator to '0'. The BS awaits the response from the PCF to determine if a traffic channel needs to be established. Alternatively, if upon receipt of the A9-Setup-A8 message the PDSN has no data to send to the MS (in the case of a dormant handoff), or if the PCF could not setup the A8 connection due to PDSN resources being unavailable, the PCF sends the A9-Release-A8 Complete message. Upon receipt of this message, the BS stops timer  $T_{A8-Setup}$ .

If the A9-Setup-A8 message contains a Data Ready Indicator set to '0' and the PCF does not have data to send, the PCF rejects the attempt to setup the A8 connection by sending an A9-Release A8-Complete message to the BS.

This message is also sent as a result of a CCPD Mode Request from a mobile, or a network initiated CCPD Mode. The BS shall set the CCPD Mode bit in the message to '1' to indicate to the PCF that an A8 connection is not required for the call. If the CCPD

1 mode request was initiated by a CCPD Device, i.e. the mobile doesn't support IS-2000  
2 traffic channels, the BS shall set the CCPD Device bit in the message to '1'.

### 3 2.1.1.2 Failure Operation

---

4 If the BS fails to receive an A9-Connect-A8, that is to say, the timer  $T_{A8\text{-setup}}$  has expired  
5 before receiving an A9-Connect-A8 or A9-Release-A8 Complete message, the BS sends  
6 an Assignment Failure message or a Handoff Failure message, as appropriate, to the  
7 MSC.

8 If the message was sent as a result of a CCPD Mode request and the timer expires, the  
9 CCPD call attempt shall fail.

10 If the A10/A11 connection establishment procedure is required but fails, the PCF should  
11 send an A9-Release-A8 Complete message with Cause Value set to "PDSN resources not  
12 available (0x79)".

## 13 2.1.2 A9-Connect-A8

---

14 This A9 message is used to respond to an A9-Setup-A8 message.

### 15 2.1.2.1 Successful Operation

---

16 The PCF sends an A9-Connect-A8 message to the BS in response to an A9-Setup-A8  
17 message. If establishment of an A10/A11 connection is needed (e.g., during normal call  
18 setup), this message shall be sent after the connection establishment is successful. If the  
19 handoff indicator field of the A9-Setup-A8 message is set to '1', the PCF starts timer  
20  $T_{\text{wait}9}$ . The PCF stops timer  $T_{\text{wait}9}$  upon receipt of the A9-AL (Air Link) Connected  
21 message. Upon receiving the A9-Connect-A8 message, the BS stops the timer  $T_{A8\text{-setup}}$ .

22 Then the BS sends an Assignment Complete message or a Handoff Request Ack message  
23 to the MSC to indicate that all resources for the requested connection have been allocated  
24 successfully.

### 25 2.1.2.2 Failure Operation

---

26 If the timer  $T_{\text{wait}9}$  expires, the PCF should initiate clearing of the A8 connection by  
27 sending a A9-Disconnect-A8 to the BS. The PCF starts timer  $T_{\text{discon}9}$ .

## 28 2.1.3 A9-BS Service Request

---

29 This A9 interface message is sent from the PCF to the BS to begin a BS initiated call  
30 setup.

### 31 2.1.3.1 Successful Operation

---

32 In order to initiate a call setup, the PCF sends an A9-BS Service Request message to the  
33 BS containing the identity of the mobile station that needs to be paged. The PCF starts  
34 timer  $T_{\text{bsreq}9}$  and awaits the reception of the A9-BS Service Response message.

|    |              |   |
|----|--------------|---|
| 1  | 2.1.3.2      | Failure Operation   |
| 2  |              | If an A9-BS Service Response message is not received at the PCF before the expiration       |
| 3  |              | of timer $T_{bsreq9}$ , then the PCF may resend the A9-BS Service Request message.          |
| 4  | <b>2.1.4</b> | <b>A9-BS Service Response</b>   |
| 5  |              | This A9 interface message is sent from the BS to the PCF in response to an A9-BS            |
| 6  |              | Service Request.  |
| 7  | 2.1.4.1      | Successful Operation  |
| 8  |              | The BS shall send an A9-BS Service Response message to the PCF originating the A9-          |
| 9  |              | BS Service Request message. Upon receiving the A9-BS Service Response Message, the          |
| 10 |              | PCF stops timer $T_{bsreq9}$ .  |
| 11 | 2.1.4.2      | Failure Operation   |
| 12 |              | None.   |
| 13 | <b>2.2</b>   | <b>A8/A9 Interface Clearing Procedures and Messages</b>                                     |
| 14 |              |   |
| 15 | <b>2.2.1</b> | <b>A8/A9 Interface Clearing Procedures</b>  |
| 16 |              | Procedures for clearing the A8 connection are described in this section. An A8              |
| 17 |              | connection clearing is initiated whenever the state of the packet data service changes      |
| 18 |              | from the active state to the dormant/null state. Clearing the A8 connection and the traffic |
| 19 |              | channel does not necessarily correspond to clearing of the packet data service session.     |
| 20 |              | These scenarios assume that the mobile is not engaged in concurrent services.               |
| 21 | 2.2.1.1      | Successful Clearing Scenarios   |
| 22 |              | An A8 connection clearing occurs:   |
| 23 |              | • When a packet data inactivity timer in the BS expires. The BS, after sending the          |
| 24 |              | Clear Request message, sets timer $T_{300}$ and waits for a Clear Command message           |
| 25 |              | from the MSC. To release all allocated resources, the MSC shall send a Clear                |
| 26 |              | Command message to the BS, start timer $T_{315}$ , and wait for the Clear Complete          |
| 27 |              | message from the BS. After stopping timer $T_{300}$ and releasing the air resources, the    |
| 28 |              | BS sends an A9-Release-A8 message to the PCF and starts timer $T_{rel9}$ . The PCF          |
| 29 |              | responds with an A9-Release-A8 Complete message. Then the BS sends a Clear                  |
| 30 |              | Complete message and stops timer $T_{rel9}$ . The call flow scenario is illustrated in [13] |
| 31 |              | section 3.11.4.2.2 "BS Initiated Call Release to Dormant State".                            |
| 32 |              | • When the packet data inactivity timer in the MS expires. When the BS receives a           |
| 33 |              | Release Order requesting the transition to dormant, the BS shall send a Clear               |
| 34 |              | Request message to the MSC. The rest of the procedure is same as the BS initiated           |
| 35 |              | scenario. The call flow scenario is illustrated in [13] section 3.11.4.2.3 "MS Initiated    |
| 36 |              | Call Release to Dormant State".   |

- 1 • When the MS releases the call. When the BS receives a Release Order, the BS shall  
2 send a Clear Request message to the MSC and start timer  $T_{300}$ . To release all  
3 allocated resources, the MSC shall send a Clear Command message to the BS, start  
4 timer  $T_{315}$ , and wait for the Clear Complete message from the BS. After stopping  
5 timer  $T_{300}$  and releasing the air resources with the Release Order, the BS sends an  
6 A9-Release-A8 message to the PCF and starts timer  $T_{rel9}$ . The PCF responds with an  
7 A9-Release-A8 Complete message. Then the BS sends a Clear Complete message  
8 and stops timer  $T_{rel9}$ . The scenario is illustrated by the call flow in [13] section  
9 3.11.4.2.4 "MS Power Down".
- 10 • When the A10/A11 connection is released by the PDSN. When the PCF detects that  
11 the A10/A11 connection is released, the PCF sends an A9-Disconnect-A8 message  
12 to the BS and starts timer  $T_{discon9}$ . Then the BS initiates the release of the A8  
13 connection by sending an A9-Release-A8 message and starts timer  $T_{rel9}$ . The PCF  
14 responds with an A9-Release-A8 Complete message and stops timer  $T_{discon9}$ . The  
15 BS, after sending the Clear Request message and stopping timer  $T_{rel9}$ , sets timer  $T_{300}$   
16 and waits for a Clear Command message from the MSC. To release all allocated  
17 resources, the MSC shall send a Clear Command message to the BS, start timer  $T_{315}$ ,  
18 and wait for the Clear Complete message from the BS. Then the BS stops timer  $T_{300}$ ,  
19 releases the air resources, and responds with a Clear Complete message. The call  
20 flow scenario is illustrated in [13] section 3.11.4.2.5 "PDSN Initiated Service  
21 Release".

22 Note that the A9-Release-A8 message and A9-Release-A8 Complete message are also  
23 used to indicate that an A8 connection is not being established due to either PDSN  
24 resources being unavailable, during dormant handoff if the PDSN has no data to send, or  
25 during a CCPD call.

### 27 2.2.1.2 Unsuccessful A8 Interface Clearing Procedures

---

28 Refer to the message procedures for the A9-Release-A8, A9-Release-A8 Complete and  
29 A9-Disconnect-A8 messages in sections 2.2.2, 2.2.3 and 2.2.4.

## 30 2.2.2 A9-Release-A8

---

31 This A9 interface message is sent from the BS to the PCF to request the release of the  
32 associated dedicated resource.

### 33 2.2.2.1 Successful Operation

---

34 When the BS needs to release an A8 connection, it sends an A9-Release-A8 message to  
35 the PCF. The BS starts timer  $T_{rel9}$  and waits for the A9-Release-A8 Complete message  
36 from the PCF.

37 When the PCF receives the A9-Release-A8 message, it stops timer  $T_{discon9}$  or  $T_{aldak}$  if it  
38 is active and performs the appropriate procedure to release the associated dedicated  
39 resources. For the handoff case, timer  $T_{wait9}$  is stopped.

### 2.2.2.2 Failure Operation

---

If an A9-Release-A8 Complete message is not received from the PCF before timer  $T_{rel9}$  expires, the BS may resend the A9-Release-A8 message to the PCF and restart timer  $T_{rel9}$ . If the A9-Release-A8 Complete message is not received from the PCF before timer  $T_{rel9}$  expires a second time or if the BS chooses to not resend the A9-Release-A8 message, the BS shall cease further supervision of this call connection, release all dedicated resources, air and terrestrial, and release the connection.

## 2.2.3 A9-Release-A8 Complete

---

This A9 interface message is sent from the PCF to the BS to acknowledge completion of the request to release the A8 connection or to indicate to the BS that an A8 connection has not been established due to either PDSN resources being unavailable, during dormant handoffs if the PDSN has no data to send, or during a CCPD mode call setup.

### 2.2.3.1 Successful Operation

---

Upon receipt of the A9-Release-A8 message from the BS, the PCF closes the A8 connection and sends an A9-Release-A8 Complete to notify the BS of the outcome. Alternatively, if upon receipt of the A9-Setup-A8 message the PDSN has no data to send to the MS (in the case of a dormant handoff), the PCF could not setup the A8 connection due to PDSN resources being unavailable, or a CCPD mode call setup or dormant mode handoff is being performed for a CCPD mobile, the PCF shall send the A9-Release-A8 Complete message. Upon receipt of this message the BS stops timer  $T_{A8-Setup}$  if the message was sent in response to an A9-Setup-A8. The BS stops timer  $T_{rel9}$  if the message was sent in response to an A9-Release-A8.

### 2.2.3.2 Failure Operation

---

None.

## 2.2.4 A9-Disconnect-A8

---

This A9 interface message is sent from the PCF to the BS to request to release the associated dedicated resource.

### 2.2.4.1 Successful Operation

---

When the PCF needs to release an A8 connection, it sends an A9-Disconnect-A8 message to the BS. The PCF starts timer  $T_{discon9}$ .

### 2.2.4.2 Failure Operation

---

If an A9-Release-A8 message is not received from the BS before timer  $T_{discon9}$  expires, the PCF may resend an A9-Disconnect-A8 message to the BS and restart timer  $T_{discon9}$ . If the A9-Release-A8 message is not received from the BS before timer  $T_{discon9}$  expires a second time or if the PCF chooses to not resend the A9-Disconnect-A8 message, the PCF shall cease further supervision of this call connection, send the A9-Release-A8 Complete message, and release its resources.

## 2.2.5 A9-Update-A8

---

This A9 interface message is sent from the BS to the PCF and is used in several cases. First, it is used to convey accounting information to the PCF if the A8 connection is established before traffic channel establishment (in which case the PCF resumes data transmission on the A8 connection only after it receives the A9-Update-A8 message) or during an active session following accounting parameter changes which need to be conveyed to the PDSN indirectly via the PCF.

This A9 interface message can also be used to inform the PCF of an authentication failure at the MSC following an access attempt by a mobile undergoing dormant handoff. The BS can also use this message to inform the PCF that a dormant mobile has powered down. In these two cases, the PCF initiates the release of the A10 connection associated with the mobile. This A9 message may also be used to indicate to the PCF a successful Short Data Burst delivery.

### 2.2.5.1 Successful operation

---

The BS sends the A9-Update-A8 message with the appropriate Update reason and starts timer  $T_{upd9}$ .

### 2.2.5.2 Failure operation

---

If an A9-Update-A8-Ack is not received from the PCF before timer  $T_{upd9}$  expires, the BS may resend the A9-Update-A8 message and restart timer  $T_{upd9}$ . If the Acknowledgment is not received from the PCF before timer  $T_{upd9}$  expires a configurable number of times, the BS ceases sending this message, and commences call clearing.

## 2.2.6 A9-Update-A8 Ack

---

This A9 interface message is sent from the PCF to the BS to indicate the result of processing the A9-Update-A8 message.

### 2.2.6.1 Successful operation

---

Upon receipt of an A9-Update-A8 message from the BS, the PCF shall transmit the A9-Update-A8 Ack message to the BS to indicate the result of processing the received message. The BS shall stop timer  $T_{upd9}$  upon receipt of the A9-Update-A8 Ack message.

### 2.2.6.2 Failure operation

---

None.

## 2.3 A8/A9 Interface Handoff Procedures and Messages

---

This section contains the messages used during handoff procedure.

### 2.3.1 A9-Air Link (AL) Connected

---

After the mobile station performs (inter-BS) hard handoff, the A9-AL Connected message is sent from the target BS managing the active air link to the target PCF. This

1 message is employed in order to notify the target PCF that handoff is successfully  
 2 completed and that the air link has been established and that the PCF can send packets on  
 3 the new A8 connection. An A9-AL Connected Ack message is expected in response in a  
 4 successful situation. If the target PCF is not able to establish an A10 connection with a  
 5 selected PDSN, it sends back an A9-Disconnect-A8 to the BS to release the A8  
 6 connection.

#### 7 **2.3.1.1 Successful Operation**

---

8 After the mobile station performs (inter-BS) hard handoff including the case of return on  
 9 failure, the target BS managing the active air link sends the A9-AL Connected message  
 10 to the target PCF and starts timer  $T_{alc9}$ .

11 Upon the receipt of the A9-AL Connected message, the PCF updates its routing table to  
 12 route packet data sent from the PDSN to the target BS managing the active air link. The  
 13 PCF performs A10/A11 connection establishment if the A10/A11 connection has not  
 14 been established yet. If the PCF is unable to establish the new A10/A11 connection, it  
 15 sends an A9-Disconnect-A8 message to the BS. Upon receipt of this message, the BS  
 16 begins call tear-down.

#### 17 **2.3.1.2 Failure Operation**

---

18 If timer  $T_{alc9}$  expires, the message may be resent. If the A9-AL-Connected message is not  
 19 resent or resending of this message also results in failure, the BS shall send either a  
 20 Service Release message (in the case the handoff was for a concurrent service) or a Clear  
 21 Request message (in the case the handoff was for a single service) to the MSC. If the  
 22 target PCF is unable to establish an A10 connection with a selected PDSN it should  
 23 release the A8 connection. It does so by signaling to the BS that the A8 connection is to  
 24 be torn down (via the A9-Disconnect-A8 message).

### 25 **2.3.2 A9-Air Link (AL) Connected Ack**

---

26 The A9-AL Connected Ack message is sent from the target PCF to the target BS to  
 27 indicate the result of processing the A9-AL Connected message.

#### 28 **2.3.2.1 Successful Operation**

---

29 Upon receipt of an A9-AL Connected message from the target BS, the PCF shall transmit  
 30 an A9-AL Connected Ack message to the target BS to indicate the outcome of processing  
 31 the received message. The target BS shall stop timer  $T_{alc9}$ .

#### 32 **2.3.2.2 Failure Operation**

---

33 None.

### 34 **2.3.3 A9-Air Link (AL) Disconnected**

---

35 When the mobile station performs hard handoff, the A9-AL Disconnected message is  
 36 sent from the source BS to the source PCF. This message is employed in order to notify  
 37 the source PCF that the air link is temporarily disconnected. An A9-AL Disconnected  
 38 Ack message is expected in response.

---

### 1 2.3.3.1 Successful Operation

---

2 When the source BS receives the Handoff Command message which instructs it to  
3 perform hard handoff, the source BS shall send an A9-AL Disconnected message to the  
4 PCF and start timer  $T_{ald9}$ .

5 Upon receipt of an A9-AL Disconnected message from the source BS, the PCF shall stop  
6 transmitting packet data and start buffering packets from the PDSN.

---

### 7 2.3.3.2 Failure Operation

---

8 If timer  $T_{ald9}$  expires, the message may be resent.

---

## 9 2.3.4 A9-Air Link (AL) Disconnected Ack

---

10 The A9-AL Disconnected Ack message is sent from the PCF to the BS to indicate the  
11 result of processing the A9-AL Disconnected message.

---

### 12 2.3.4.1 Successful Operation

---

13 Upon receipt of an A9-AL Disconnected message from the BS, the PCF shall transmit an  
14 A9-AL Disconnected Ack message to the BS to indicate the outcome of processing the  
15 received message. The source BS shall stop timer  $T_{ald9}$  upon receipt of the A9-AL  
16 Disconnected Ack message. The PCF starts timer  $T_{aldak}$ .

---

### 17 2.3.4.2 Failure Operation

---

18 If timer  $T_{aldak}$  expires, the PCF may send the A9-AL Disconnected Ack to the BS again. .

---

## 19 2.3.5 A9-Short Data Delivery

---

20 This A9 interface message is sent from the BS to the PCF when it receives a short data  
21 burst from the MS. It may also be sent from the PCF to the BS when there is a small  
22 amount of packet data to be sent from the PDSN to a mobile. This message is used when  
23 the mobile's packet data service instance is dormant. The data is encapsulated in the  
24 ADDS user part element in SDB format as specified in [28].

25 This message is sent from the PCF to the BS when the PCF determines that a short data  
26 burst may be used to send the data to a dormant packet data service instance at the  
27 mobile.

28 When used in the PCF to BS direction, the PCF retains a copy of the data sent in the  
29 message. The message also contains a count of the number of additional bytes of data  
30 remaining at the PCF for the packet data service instance. This information may be used  
31 by the BS, for example in determining whether short data bursts could be used to deliver  
32 the data to the mobile.

33 When used to send data from the PCF to the BS for a CCPD device, the PCF shall not  
34 buffer the data.

---

### 2.3.5.1 Successful Operation

---

The BS sends the A9-Short Data Delivery message to the PCF after receiving a short data burst from the mobile and after optionally authenticating the mobile. Upon receipt of this message by the PCF, the packet data is sent to the PDSN.

The PCF sends the A9-Short Data Delivery message to the BS when it determines that there is a small amount of data to be sent to a dormant packet data service instance at the mobile or if the data is destined for a CCPD device. If the data is not being sent for a CCPD device, the PCF starts timer  $T_{sdd9}$  and waits for an A9-Short Data Ack message from the BS. If the BS decides that the data can be sent to the mobile as a Short Data Burst, an A9-Short Data Ack message is sent to the PCF with a successful Cause Value. The BS may also reject the PCF's request for a short data burst delivery via the A9-Short Data Ack. If the data is destined for a CCPD device, the BS shall not respond to the PCF with an A9-Short Data Ack message.

---

### 2.3.5.2 Failure Operation

---

If timer  $T_{sdd9}$  expires before the PCF receives an A9-Short Data Ack message from the BS, the buffered data at the PCF is discarded. This operation does not apply if the data was sent for a CCPD device.

---

## 2.3.6 A9-Short Data Ack

---

This message is sent from the BS to the PCF to acknowledge the receipt of the A9-Short Data Delivery message from the PCF. It also indicates to the PCF whether the data received is to be sent to the MS as a short data burst. This message is not used if the data sent from the PCF to the BS was destined for a CCPD device.

---

### 2.3.6.1 Successful Operation

---

If the BS decides to send the data received from the PCF to the mobile as a short data burst, it shall indicate this to the PCF in the A9-Short Data Ack message. Upon receiving this indication, the PCF cancels timer  $T_{sdd9}$  and discards its copy of the buffered data. Note that acceptance of the data is independent of how what mechanism the BS chooses to send the data to the MS over the air interface. The BS may send this data directly to the mobile via a short data burst, or it may forward the data to the MSC using the BS Service Request/Response procedure. If the BS is unsuccessful in delivering the data to the MS on its own, it may choose to send the data to the MSC for delivery to the mobile via the ADDS Page procedure.

If the BS decides against delivering the data to the mobile as an SDB, it shall respond to the PCF with an A9-Short Data Ack message with a reject indication. Upon reception of this message, the PCF shall cancel timer  $T_{sdd9}$  and then initiate re-activation of the packet data service instance from the dormant state. Refer to [13] for more details.

---

### 2.3.6.2 Failure Operation

---

None.

---

## 2.4 A8/A9 Interface Maintenance Procedures and Messages

---

This section describes the A9 version control messages.

## 2.4.1 A9-Version Info

---

This A9 interface message is sent from the PCF to the BS, or the BS to the PCF, when the sending entity requires the software version information of the receiving entity. The message may also be sent as result of BS or PCF reset. The sending entity includes its software version information in the message and a Cause Value if the message is sent as the result of reset.

### 2.4.1.1 Successful Operation

---

The sending entity starts timer  $T_{\text{vers9}}$  after the message is sent. The receiving entity responds with the A9-Version Info Ack message, which includes its software version information in the message.

### 2.4.1.2 Failure Operation

---

If the receiving entity fails to respond with an A9-Version Info Ack message prior to the expiration of Timer  $T_{\text{vers9}}$ , the sending entity may resend the message.

## 2.4.2 A9-Version Info Ack

---

This A9 interface message is sent from the PCF to the BS, or the BS to the PCF, in response to the A9-Version Info message. The message includes the software version information of the receiving entity.

### 2.4.2.1 Successful Operation

---

The BS or PCF that receives the A9-Version Info Ack message stops timer  $T_{\text{vers9}}$  upon reception of the message.

### 2.4.2.2 Failure Operation

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If a BS or PCF receives the A9-Version Info Ack message without initiating the procedure with an A9-Version Info message, the message shall be ignored.

## 3.0 Message Formats

### 3.1 A9-Setup-A8

This A9 interface message is sent from the BS to the PCF to request the establishment of an A8 connection.

| Information Element                  | Section Reference | Element Direction | Type           |   |
|--------------------------------------|-------------------|-------------------|----------------|---|
| A9 Message Type                      | 4.2.13            | BS -> PCF         | M              |   |
| Call Connection Reference            | 4.2.10            | BS -> PCF         | O              | R |
| Correlation ID                       | 4.2.11            | BS -> PCF         | O <sup>a</sup> | C |
| Mobile Identity (IMSI)               | 4.2.2             | BS -> PCF         | O              | R |
| Mobile Identity (ESN)                | 4.2.2             | BS -> PCF         | O <sup>b</sup> | C |
| CON_REF                              | 4.2.14            | BS -> PCF         | O              | R |
| Quality of Service Parameters        | 4.2.7             | BS -> PCF         | O <sup>c</sup> | C |
| A9 Cell Identifier                   | 4.2.15            | BS -> PCF         | O              | R |
| A8_Traffic_ID                        | 4.2.16            | BS -> PCF         | O              | R |
| Service Option                       | 4.2.8             | BS -> PCF         | O <sup>d</sup> | R |
| A9 Indicators                        | 4.2.17            | BS -> PCF         | O              | R |
| User Zone ID                         | 4.2.6             | BS -> PCF         | O              | C |
| IS-2000 Service Configuration Record | 4.2.20            | BS -> PCF         | O <sup>e</sup> | C |
| Access Network Identifiers           | 4.2.19            | BS -> PCF         | O <sup>f</sup> | C |
| Current PDSN Address (source)        | 4.2.5             | BS -> PCF         | O <sup>g</sup> | C |
| Anchor PDSN Address                  | 4.2.22            | BS -> PCF         | O <sup>g</sup> | C |
| Anchor P-P Address                   | 4.2.12            | BS -> PCF         | O <sup>i</sup> | C |

- a. If this element is included in this message, its value shall be returned in the corresponding element in the A9-Connect A8 message sent in response to this message.
- b. This second occurrence of the Mobile Identity element, if included, shall contain the ESN of the MS. Use of the ESN in this message is a network operator decision.
- c. This information element is included if information is available at the BS. In this version of this standard, this element is used to carry the current non-assured mode priority of the packet data session.
- d. The User Zone ID is included if received from the MS.
- e. This information element may be omitted if the BS does not possess this information at the time the message is created.
- f. The Access Node Identifiers (PANID) are included if received from the MS.
- g. This is the IP address for the A10/A11 interface of the source PDSN. This element is only present if the BS received this information from source BS as part of a Fast Handoff request.

- 1 h. This is the IP address for the A10/A11 interface of the anchor PDSN. This
- 2 element is only present if the BS received this information from source BS as
- 3 part of a Fast Handoff request.
- 4 i. This is the IP address for the P-P interface of the anchor PDSN. This element
- 5 is only present if the BS received this information from source BS as part of a
- 6 Fast Handoff request.

7 The following table shows the bitmap layout for the A9-Setup-A8 message.

| 7   | 6                                       | 5 | 4                                  | 3 | 2                                  | 1 | 0     | Octet |
|---|---|---|------------------------------------|---|------------------------------------|---|-------|-------|
| ⇒ <b>A9 Message Type</b> = [01H]                                  |   |   |                                    |   |                                    |   |       | 1     |
| ⇒ <b>Call Connection Reference:</b> A9 Element Identifier = [3FH] |   |   |                                    |   |                                    |   |       | 1     |
| Length = [08H]  |   |   |                                    |   |                                    |   |       | 2     |
| (MSB)   | Market ID = <any value>                 |   |                                    |   |                                    |   | (LSB) | 3     |
|   |   |   |                                    |   |                                    |   |       | 4     |
| (MSB)   | Generating Entity ID = <any value>      |   |                                    |   |                                    |   | (LSB) | 5     |
|   |   |   |                                    |   |                                    |   |       | 6     |
| (MSB)   | Call Connection Reference = <any value> |   |                                    |   |                                    |   | (LSB) | 7     |
|   |   |   |                                    |   |                                    |   |       | 8     |
|   |   |   |                                    |   |                                    |   |       | 9     |
|   |   |   |                                    |   |                                    |   |       | 10    |
| ⇒ <b>Correlation ID:</b> A9 Element Identifier = [13H]            |   |   |                                    |   |                                    |   |       | 1     |
| Length = [04H]  |   |   |                                    |   |                                    |   |       | 2     |
| (MSB)   | Correlation Value = <any value>         |   |                                    |   |                                    |   | (LSB) | 3     |
|   |   |   |                                    |   |                                    |   |       | 4     |
|   |   |   |                                    |   |                                    |   |       | 5     |
|   |   |   |                                    |   |                                    |   |       | 6     |
| ⇒ <b>Mobile Identity (IMSI):</b> A9 Element Identifier = [0DH]    |   |   |                                    |   |                                    |   |       | 1     |
| Length = [06H-08H] (10-15 digits)                                 |   |   |                                    |   |                                    |   |       | 2     |
| Identity Digit 1 = [0H-9H] (BCD)                                  |   |   | Odd/even<br>Indicator<br>= [1,0]   |   | Type of Identity<br>= [110] (IMSI) |   |       | 3     |
| Identity Digit 3 = [0H-9H] (BCD)                                  |   |   | Identity Digit 2 = [0H-9H] (BCD)   |   |                                    |   |       | 4     |
| • • •   |   |   |                                    |   |                                    |   |       | • • • |
| Identity Digit N+1 = [0H-9H] (BCD)                                |   |   | Identity Digit N = [0H-9H] (BCD)   |   |                                    |   |       | n     |
| = [1111] (if even number of digits)                               |   |   | Identity Digit N+2 = [0H-9H] (BCD) |   |                                    |   |       | n+1   |
| ⇒ <b>Mobile Identity (ESN):</b> A9 Element Identifier = [0DH]     |   |   |                                    |   |                                    |   |       | 1     |
| Length = [05H]  |   |   |                                    |   |                                    |   |       | 2     |
| Identity Digit 1 = [0000]   |   |   | Odd/even<br>Indicator<br>= [0]     |   | Type of Identity<br>= [101] (ESN)  |   |       | 3     |

|       |   |    |
|-------|---|----|
| (MSB) |   | 4  |
|       | ESN = <any value>   | 5  |
|       |   | 6  |
|       | (LSB)   | 7  |
| ⇒     | <b>CON_REF:</b> A9 Element Identifier = [01H]                       | 1  |
|       | Length = [01H]  | 2  |
|       | IS-2000 CON_REF = [00H – FFH]                                       | 3  |
| ⇒     | <b>Quality of Service Parameters:</b> A9 Element Identifier = [07H] | 1  |
|       | Length = [01H]  | 2  |
|       | Reserved = [0000]   | 3  |
|       | Non-Assured Mode Packet Priority = [0000 – 1101]                    |    |
| ⇒     | <b>A9 Cell Identifier:</b> A9 Element Identifier = [06H]            | 1  |
|       | Length = [06H]  | 2  |
|       | Cell Identification Discriminator = [ 07H]                          | 3  |
| (MSB) |   | 4  |
|       | MSCID = <any value>   | 5  |
|       | (LSB)   | 6  |
| (MSB) | Cell = [001H-FFFH]  | 7  |
|       | (LSB) Sector = [0H-FH] (0H = Omni)                                  | 8  |
| ⇒     | <b>A8 Traffic ID:</b> A9 Element Identifier = [08H]                 | 1  |
|       | Length = [0CH]  | 2  |
|       | A8 transport protocol stack = [01H] (GRE/IP)                        | 3  |
| (MSB) | Protocol Type = [88 81H] (Unstructured byte stream)                 | 4  |
|       | (LSB)   | 5  |
| (MSB) |   | 6  |
|       | Key = <any value>   | 7  |
|       |   | 8  |
|       | (LSB)   | 9  |
|       | Address Type = [01H] (IPv4)   | 10 |
| (MSB) |   | 11 |
|       | IP Address = <any value>  | 12 |
|       |   | 13 |
|       | (LSB)   | 14 |
| ⇒     | <b>Service Option:</b> A9 Element Identifier = [03H]                | 1  |
| (MSB) | Service Option  | 2  |
|       | = [ 00 21H (3G High Speed Packet Data) ]                            | 3  |
|       | (LSB)   |    |
| ⇒     | <b>A9 Indicators:</b> A9 Element Identifier = [05H]                 | 1  |
|       | Length = [01H]  | 2  |

|  |  |  |  |   |  |   |  |   |
|--|--|--|--|---|--|---|--|---|
| Reserved = [0000]  |  | CCPD Mode = [0,1]  | CCPD Devic e = [0,1]                                     | Data Ready Indicator = [0,1]                              | Handoff indicator = [0, 1]                               | 3   |  |   |
| ⇒ <b>User Zone ID: A9 Element Identifier = [02H]</b>                         |  |  |  |   |  | 1   |  |   |
| Length = [02H]   |  |  |  |   |  | 2   |  |   |
| (MSB)  | UZID = <any value>   |  |  |   |  | 3   |  |   |
|  |  |  |  |   | (LSB)  | 4   |  |   |
| ⇒ <b>IS-2000 Service Configuration Record: A9 Element Identifier = [0EH]</b> |  |  |  |   |  | 1   |  |   |
| Bit-Exact Length – Octet Count = <variable>                                  |  |  |  |   |  | 2   |  |   |
| Reserved = [ 0000 0 ]  |  |  | Bit-Exact Length – Fill Bits = [ 000 – 111 ]             |   |  | 3   |  |   |
| (MSB)  |  |  |  |   |  | 4   |  |   |
| IS-2000 Service Configuration Record Content = <any value>                   |  |  |  |   |  | ...   |  |   |
|  | Seventh Fill Bit – if needed = [0 (if used as a fill bit)] | Sixth Fill Bit – if needed = [0 (if used as a fill bit)] | Fifth Fill Bit – if needed = [0 (if used as a fill bit)] | Fourth Fill Bit – if needed = [0 (if used as a fill bit)] | Third Fill Bit – if needed = [0 (if used as a fill bit)] | Second Fill Bit – if needed = [0 (if used as a fill bit)] | First Fill Bit – if needed = [0 (if used as a fill bit)] | k |
| ⇒ <b>Access Network Identifiers: A9 Element Identifier = [20H]</b>           |  |  |  |   |  | 1   |  |   |
| Length = [05H]   |  |  |  |   |  | 2   |  |   |
| Reserved = [0]   | (MSB)  | SID = <any value>  |  |   |  | 3   |  |   |
|  |  |  |  |   | (LSB)  | 4   |  |   |
| (MSB)  | NID = <any value>  |  |  |   |  | 5   |  |   |
|  |  |  |  |   | (LSB)  | 6   |  |   |
| PZID = <any value>   |  |  |  |   |  | 7   |  |   |
| ⇒ <b>Current PDSN IP Address: A9 Element Identifier = [14H]</b>              |  |  |  |   |  | 1   |  |   |
| Length = [04H]   |  |  |  |   |  | 2   |  |   |
| (MSB)  | Current PDSN IP Address = <any value>                      |  |  |   |  | 3   |  |   |
|  |  |  |  |   | (LSB)  | 4   |  |   |
| ⇒ <b>Anchor PDSN Address: A9 Element Identifier = [30H]</b>                  |  |  |  |   |  | 1   |  |   |
| Length = [04H]   |  |  |  |   |  | 2   |  |   |
| (MSB)  | Anchor PDSN Address = <any value>                          |  |  |   |  | 3   |  |   |
|  |  |  |  |   | (LSB)  | 4   |  |   |
| ⇒ <b>Anchor P-P Address: A9 Element Identifier = [40H]</b>                   |  |  |  |   |  | 1   |  |   |

|                                      |       |   |
|--------------------------------------|-------|---|
| Length = [04H]                       |       | 2 |
| (MSB)                                |       | 3 |
| Serving P-P IP Address = <any value> |       | 4 |
|                                      |       | 5 |
|                                      | (LSB) | 6 |

1

## 3.2 A9-Connect-A8

This A9 interface message is sent from the PCF to the BS to complete the setup of the A8 connection.

| Information Element       | Section Reference | Element Direction | Type           |   |
|---------------------------|-------------------|-------------------|----------------|---|
| A9 Message Type           | 4.2.13            | PCF -> BS         | M              |   |
| Call Connection Reference | 4.2.10            | PCF -> BS         | O              | R |
| Correlation ID            | 4.2.11            | PCF -> BS         | O <sup>a</sup> | C |
| Mobile Identity (IMSI)    | 4.2.2             | PCF -> BS         | O              | R |
| Mobile Identity (ESN)     | 4.2.2             | PCF -> BS         | O <sup>b</sup> | C |
| CON_REF                   | 4.2.14            | PCF -> BS         | O              | R |
| A8_Traffic_ID             | 4.2.16            | PCF -> BS         | O              | R |
| Cause                     | 4.2.3             | PCF -> BS         | O <sup>c</sup> | R |
| Current PDSN IP Address   | 4.2.5             | PCF -> BS         | O <sup>d</sup> | R |
| Anchor PDSN Address       | 4.2.22            | PCF -> BS         | O <sup>e</sup> | C |
| Anchor P-P Address        | 4.2.12            | PCF -> BS         | O <sup>f</sup> | C |

- a. This element shall only be included if it was also included in the A9-Setup-A8 message. This element shall be set to the value received in that message.
- b. This second occurrence of the Mobile Identity element, if included, shall contain the ESN of the MS. Use of the ESN in this message is a network operator decision.
- c. Allowable Cause Values are: "PCF resources not available"; "Equipment failure"; "Successful operation", "PDSN resources are not available", "Data ready to send".
- d. This is the IP address of the A11 connection of the PDSN that terminates the A10 connection corresponding to the just-established A8 connection. It is saved by the BS and included in the Handoff Required message in the event of a hard handoff.
- e. This is the IP address of the A11 connection to the anchor PDSN. This element shall be included if fast handoff is supported and if the value was received from the PDSN. It is saved by the BS and included in the Handoff Required message in the event of a fast handoff. During a fast handoff, inclusion of this field indicates acceptance of the fast handoff.
- f. This is the IP address for establishing P-P connections to the serving PDSN. This element shall be included if fast handoff is supported and if the value was received from the PDSN. It is saved by the BS and included in the Handoff Required message in the event of a fast handoff. During a fast handoff, inclusion of this field indicates acceptance of the fast handoff.

1

The following table shows the bitmap layout for the A9-Connect-A8 message.

| 7   | 6                                       | 5 | 4                                  | 3                                  | 2 | 1 | 0     | Octet |    |
|---|---|---|------------------------------------|------------------------------------|---|---|-------|-------|----|
| ⇒ <b>A9 Message Type</b> = [02H]                                  |   |   |                                    |                                    |   |   |       | 1     |    |
| ⇒ <b>Call Connection Reference:</b> A9 Element Identifier = [3FH] |   |   |                                    |                                    |   |   |       | 1     |    |
| Length = [08H]  |   |   |                                    |                                    |   |   |       | 2     |    |
| (MSB)   | Market ID = <any value>                 |   |                                    |                                    |   |   | (LSB) | 3     |    |
|   |   |   |                                    |                                    |   |   |       | 4     |    |
| (MSB)   | Generating Entity ID = <any value>      |   |                                    |                                    |   |   | (LSB) | 5     |    |
|   |   |   |                                    |                                    |   |   |       | 6     |    |
| (MSB)   | Call Connection Reference = <any value> |   |                                    |                                    |   |   | (LSB) | 7     |    |
|   |   |   |                                    |                                    |   |   |       | 8     |    |
|   |   |   |                                    |                                    |   |   |       | 9     |    |
|   |   |   |                                    |                                    |   |   |       | (LSB) | 10 |
| ⇒ <b>Correlation ID: A9 Element Identifier</b> = [13H]            |   |   |                                    |                                    |   |   |       | 1     |    |
| Length = [04H]  |   |   |                                    |                                    |   |   |       | 2     |    |
| (MSB)   | Correlation Value = <any value>         |   |                                    |                                    |   |   | (LSB) | 3     |    |
|   |   |   |                                    |                                    |   |   |       | 4     |    |
|   |   |   |                                    |                                    |   |   |       | 5     |    |
|   |   |   |                                    |                                    |   |   |       | (LSB) | 6  |
| ⇒ <b>Mobile Identity (IMSI):</b> A9 Element Identifier = [0DH]    |   |   |                                    |                                    |   |   |       | 1     |    |
| Length = [06H-08H] (10-15 digits)                                 |   |   |                                    |                                    |   |   |       | 2     |    |
| Identity Digit 1 = [0H-9H] (BCD)                                  |   |   | Odd/even<br>Indicator<br>= [1,0]   | Type of Identity<br>= [110] (IMSI) |   |   |       | 3     |    |
| Identity Digit 3 = [0H-9H] (BCD)                                  |   |   | Identity Digit 2 = [0H-9H] (BCD)   |                                    |   |   | 4     |       |    |
| • • •   |   |   |                                    |                                    |   |   |       | • • • |    |
| Identity Digit N+1 = [0H-9H] (BCD)                                |   |   | Identity Digit N = [0H-9H] (BCD)   |                                    |   |   | n     |       |    |
| = [1111] (if even number of digits)                               |   |   | Identity Digit N+2 = [0H-9H] (BCD) |                                    |   |   | n+1   |       |    |
| ⇒ <b>Mobile Identity (ESN):</b> A9 Element Identifier = [0DH]     |   |   |                                    |                                    |   |   |       | 1     |    |
| Length = [05H]  |   |   |                                    |                                    |   |   |       | 2     |    |
| Identity Digit 1 = [0000]   |   |   | Odd/even<br>Indicator<br>= [0]     | Type of Identity<br>= [101] (ESN)  |   |   |       | 3     |    |
| (MSB)   | ESN = <any value>                       |   |                                    |                                    |   |   | (LSB) | 4     |    |
|   |   |   |                                    |                                    |   |   |       | 5     |    |
|   |   |   |                                    |                                    |   |   |       | 6     |    |
|   |   |   |                                    |                                    |   |   |       | (LSB) | 7  |
| ⇒ <b>CON_REF:</b> A9 Element Identifier = [01H]                   |   |   |                                    |                                    |   |   |       | 1     |    |

|  |  |    |
|--|--|----|
| Length = [01H]   |  | 2  |
| IS-2000 CON_REF = [00H – FFH]                                |  | 3  |
| ⇒ <b>A8 Traffic ID:</b> A9 Element Identifier = [08H]        |  | 1  |
| Length = [0CH]   |  | 2  |
| <b>A8 transport protocol stack = [01H] (GRE/IP)</b>          |  | 3  |
| (MSB)  | Protocol Type = [88 81H] (Unstructured byte stream)  | 4  |
|  | (LSB)  | 5  |
| (MSB)  |  | 6  |
| Key = <any value>  |  | 7  |
|  |  | 8  |
|  | (LSB)  | 9  |
| Address Type = [01H] (IPv4)                                  |  | 10 |
| (MSB)  |  | 11 |
| IP Address = <any value>                                     |  | 12 |
|  |  | 13 |
|  | (LSB)  | 14 |
| ⇒ <b>Cause:</b> A9 Element Identifier = [04H]                |  | 1  |
| Length = [01H]   |  | 2  |
| ext = [0]  | Cause Value =<br>[13H (Successful operation),<br>20H (Equipment failure),<br>32H (PCF resources not available),<br>79H (PDSN resources are not available),<br>7AH (Data Ready to Send )] | 3  |
| ⇒ <b>Current PDSN Address:</b> A9 Element Identifier = [14H] |  | 1  |
| Length = [04H]   |  | 2  |
| (MSB)  |  | 3  |
| Current PDSN Address = <any value>                           |  | 4  |
|  |  | 5  |
|  | (LSB)  | 6  |
| ⇒ <b>Anchor PDSN Address:</b> A9 Element Identifier = [30H]  |  | 1  |
| Length = [04H]   |  | 2  |
| (MSB)  |  | 3  |
| Anchor PDSN Address = <any value>                            |  | 4  |
|  |  | 5  |
|  | (LSB)  | 6  |
| ⇒ <b>Anchor P-P Address:</b> A9 Element Identifier = [40H]   |  | 1  |
| Length = [04H]   |  | 2  |

|                                  |       |   |
|----------------------------------|-------|---|
| (MSB)                            |       | 3 |
| Anchor P-P Address = <any value> |       | 4 |
|                                  |       | 5 |
|                                  | (LSB) | 6 |

1

### 3.3 A9-Disconnect-A8

This A9 interface message is sent from the PCF to the BS to release the associated dedicated resource.

| Information Element       | Section Reference | Element Direction | Type           |   |
|---------------------------|-------------------|-------------------|----------------|---|
| A9 Message Type           | 4.2.13            | PCF -> BS         | M              |   |
| Call Connection Reference | 4.2.10            | PCF -> BS         | O              | R |
| Correlation ID            | 4.2.11            | PCF -> BS         | O <sup>a</sup> | C |
| Mobile Identity (IMSI)    | 4.2.2             | PCF -> BS         | O              | R |
| Mobile Identity (ESN)     | 4.2.2             | PCF -> BS         | O <sup>b</sup> | C |
| CON_REF                   | 4.2.14            | PCF -> BS         | O              | R |
| A8_Traffic_ID             | 4.2.16            | PCF -> BS         | O              | R |
| Cause                     | 4.2.3             | PCF -> BS         | O <sup>c</sup> | R |

- a. If this element is included in this message, its value shall be returned in the corresponding element in the A9-Release-A8 message sent in response to this message.
- b. This second occurrence of the Mobile Identity element, if included, shall contain the ESN of the MS. Use of the ESN in this message is a network operator decision.
- c. Allowable Cause Values are: "Packet call going dormant"; "Equipment failure"; "Normal call release".

The following table shows the bitmap layout for the A9-Disconnect-A8 message.

| 7  | 6                                  | 5 | 4 | 3 | 2 | 1 | 0     | Octet |    |
|--|------------------------------------|---|---|---|---|---|-------|-------|----|
| ⇒ A9 Message Type = [03H]                                  |                                    |   |   |   |   |   |       | 1     |    |
| ⇒ Call Connection Reference: A9 Element Identifier = [3FH] |                                    |   |   |   |   |   |       | 1     |    |
| Length = [08H]   |                                    |   |   |   |   |   |       | 2     |    |
| (MSB)  | Market ID = <any value>            |   |   |   |   |   | (LSB) | 3     |    |
| (MSB)  | Generating Entity ID = <any value> |   |   |   |   |   | (LSB) | 4     |    |
| (MSB)  | Generating Entity ID = <any value> |   |   |   |   |   | (LSB) | 5     |    |
| (MSB)  | Generating Entity ID = <any value> |   |   |   |   |   | (LSB) | 6     |    |
| (MSB)  | Generating Entity ID = <any value> |   |   |   |   |   | (LSB) | 7     |    |
| Call Connection Reference = <any value>                    |                                    |   |   |   |   |   |       | 8     |    |
| Call Connection Reference = <any value>                    |                                    |   |   |   |   |   |       | 9     |    |
| Call Connection Reference = <any value>                    |                                    |   |   |   |   |   |       | (LSB) | 10 |
| ⇒ Correlation ID: A9 Element Identifier = [13H]            |                                    |   |   |   |   |   |       | 1     |    |
| Length = [04H]   |                                    |   |   |   |   |   |       | 2     |    |
| (MSB)  | Correlation ID = <any value>       |   |   |   |   |   | (LSB) | 3     |    |
| Correlation Value = <any value>                            |                                    |   |   |   |   |   |       | 4     |    |

|  |   |                                 |       |
|--|---|---------------------------------|-------|
|  |   |                                 | 5     |
|  |   | (LSB)                           | 6     |
| ⇒ <b>Mobile Identity (IMSI):</b> A9 Element Identifier = [0DH] |   |                                 | 1     |
| Length = [06H-08H] (10-15 digits)                              |   |                                 | 2     |
| Identity Digit 1 = [0H-9H] (BCD)                               | Odd/even Indicator = [1,0]                          | Type of Identity = [110] (IMSI) | 3     |
| Identity Digit 3 = [0H-9H] (BCD)                               | Identity Digit 2 = [0H-9H] (BCD)                    |                                 | 4     |
| •••  |   |                                 | •••   |
| Identity Digit N+1 = [0H-9H] (BCD)                             | Identity Digit N = [0H-9H] (BCD)                    |                                 | n     |
| = [1111] (if even number of digits)                            | Identity Digit N+2 = [0H-9H] (BCD)                  |                                 | n+1   |
| ⇒ <b>Mobile Identity (ESN):</b> A9 Element Identifier = [0DH]  |   |                                 | 1     |
| Length = [05H]   |   |                                 | 2     |
| Identity Digit 1 = [0000]                                      | Odd/even Indicator = [0]                            | Type of Identity = [101] (ESN)  | 3     |
| (MSB)  |   |                                 | 4     |
| ESN = <any value>  |   |                                 | 5     |
|  |   |                                 | 6     |
|  |   |                                 | 7     |
|  |   |                                 | (LSB) |
| ⇒ <b>CON_REF:</b> A9 Element Identifier = [01H]                |   |                                 | 1     |
| Length = [01H]   |   |                                 | 2     |
| IS-2000 CON_REF = [00H – FFH]                                  |   |                                 | 3     |
| ⇒ <b>A8 Traffic ID:</b> A9 Element Identifier = [08H]          |   |                                 | 1     |
| Length = [0CH]   |   |                                 | 2     |
| <b>A8 transport protocol stack = [01H] (GRE/IP)</b>            |   |                                 | 3     |
| (MSB)  | Protocol Type = [88 81H] (Unstructured byte stream) |                                 | 4     |
|  |   |                                 | (LSB) |
| (MSB)  |   |                                 | 6     |
| Key = <any value>  |   |                                 | 7     |
|  |   |                                 | 8     |
|  |   |                                 | (LSB) |
| Address Type = [01H] (IPv4)                                    |   |                                 | 10    |
| (MSB)  |   |                                 | 11    |
| IP Address = <any value>                                       |   |                                 | 12    |
|  |   |                                 | 13    |
|  |   |                                 | (LSB) |
| ⇒ <b>Cause:</b> A9 Element Identifier = [04H]                  |   |                                 | 1     |

|           |   |   |
|-----------|---|---|
|           | Length = [01H]  | 2 |
| ext = [0] | Cause Value =<br>[10H (Packet call going dormant),<br>14H (Normal call release),<br>20H (Equipment failure) ] | 3 |

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### 3.4 A9-Release-A8

This A9 interface message is sent from the BS to the PCF to release the associated dedicated resource

| Information Element               | Section Reference | Element Direction | Type           |   |
|-----------------------------------|-------------------|-------------------|----------------|---|
| A9 Message Type                   | 4.2.13            | BS-> PCF          | M              |   |
| Call Connection Reference         | 4.2.10            | BS-> PCF          | O              | R |
| Correlation ID                    | 4.2.11            | BS-> PCF          | O <sup>a</sup> | C |
| Mobile Identity (IMSI)            | 4.2.2             | BS-> PCF          | O              | R |
| Mobile Identity (ESN)             | 4.2.2             | BS-> PCF          | O <sup>b</sup> | C |
| CON_REF                           | 4.2.14            | BS-> PCF          | O              | R |
| A8_Traffic_ID                     | 4.2.16            | BS-> PCF          | O              | R |
| Cause                             | 4.2.3             | BS-> PCF          | O <sup>c</sup> | R |
| Active Connection Time in Seconds | 4.2.1             | BS-> PCF          | O <sup>d</sup> | R |

- a. This element shall be included if it was also included in the A9-Disconnect-A8 message. This element shall be set to the value received in that message. If this element was not included in that message, it may be included in this message.
- b. This second occurrence of the Mobile Identity element, if included, shall contain the ESN of the MS. Use of the ESN in this message is a network operator decision.
- c. Allowable Cause Values are: "Packet call going dormant"; "Equipment failure"; "Normal call release"; "Handoff Successful"; "Authentication Failure". Note that Normal Call Release indicates that the service has been released and therefore the A10 resources should be dropped.
- d. This element shall be included to indicate the active connection time for a traffic channel.

The following table shows the bitmap layout for the A9-Release-A8 message.

| 7  | 6                                  | 5 | 4 | 3 | 2 | 1 | 0     | Octet |
|--|------------------------------------|---|---|---|---|---|-------|-------|
| ⇒ A9 Message Type = [04H]                                  |                                    |   |   |   |   |   |       | 1     |
| ⇒ Call Connection Reference: A9 Element Identifier = [3FH] |                                    |   |   |   |   |   |       | 1     |
| Length = [08H]   |                                    |   |   |   |   |   |       | 2     |
| (MSB)  | Market ID = <any value>            |   |   |   |   |   | (LSB) | 3     |
|  |                                    |   |   |   |   |   | (LSB) | 4     |
| (MSB)  | Generating Entity ID = <any value> |   |   |   |   |   | (LSB) | 5     |
|  |                                    |   |   |   |   |   | (LSB) | 6     |
| (MSB)  |                                    |   |   |   |   |   | (LSB) | 7     |
| Call Connection Reference = <any value>                    |                                    |   |   |   |   |   |       | 8     |
|  |                                    |   |   |   |   |   |       | 9     |
|  |                                    |   |   |   |   |   | (LSB) | 10    |

|  |   |                                 |       |
|--|---|---------------------------------|-------|
| ⇒ <b>Correlation ID:</b> A9 Element Identifier = [13H]         |   |                                 | 1     |
| Length = [04H]   |   |                                 | 2     |
| (MSB)  |   |                                 | 3     |
| Correlation Value = <any value>                                |   |                                 | 4     |
|  |   |                                 | 5     |
|  |   | (LSB)                           | 6     |
| ⇒ <b>Mobile Identity (IMSI):</b> A9 Element Identifier = [0DH] |   |                                 | 1     |
| Length = [06H-08H] (10-15 digits)                              |   |                                 | 2     |
| Identity Digit 1 = [0H-9H] (BCD)                               | Odd/even Indicator = [1,0]                          | Type of Identity = [110] (IMSI) | 3     |
| Identity Digit 3 = [0H-9H] (BCD)                               | Identity Digit 2 = [0H-9H] (BCD)                    |                                 | 4     |
| • • •  |   |                                 | • • • |
| Identity Digit N+1 = [0H-9H] (BCD)                             | Identity Digit N = [0H-9H] (BCD)                    |                                 | n     |
| = [1111] (if even number of digits)                            | Identity Digit N+2 = [0H-9H] (BCD)                  |                                 | n+1   |
| ⇒ <b>Mobile Identity (ESN):</b> A9 Element Identifier = [0DH]  |   |                                 | 1     |
| Length = [05H]   |   |                                 | 2     |
| Identity Digit 1 = [0000]                                      | Odd/even Indicator = [0]                            | Type of Identity = [101] (ESN)  | 3     |
| (MSB)  |   |                                 | 4     |
| ESN = <any value>  |   |                                 | 5     |
|  |   |                                 | 6     |
|  |   | (LSB)                           | 7     |
| ⇒ <b>CON_REF:</b> A9 Element Identifier = [01H]                |   |                                 | 1     |
| Length = [01H]   |   |                                 | 2     |
| IS-2000 CON_REF = [00H - FFH]                                  |   |                                 | 3     |
| ⇒ <b>A8 Traffic ID:</b> A9 Element Identifier = [08H]          |   |                                 | 1     |
| Length = [0CH]   |   |                                 | 2     |
| A8 transport protocol stack = [01H] (GRE/IP)                   |   |                                 | 3     |
| (MSB)  | Protocol Type = [88 81H] (Unstructured byte stream) |                                 | 4     |
|  |   | (LSB)                           | 5     |
| (MSB)  |   |                                 | 6     |
| Key = <any value>  |   |                                 | 7     |
|  |   |                                 | 8     |
|  |   | (LSB)                           | 9     |
| Address Type = [01H] (IPv4)                                    |   |                                 | 10    |
| (MSB)  |   |                                 | 11    |

|   |   |    |
|---|---|----|
| IP Address = <any value>  |   | 12 |
|   |   | 13 |
|   | (LSB)   | 14 |
| ⇒ <b>Cause:</b> A9 Element Identifier = [04H]                             |   | 1  |
| Length = [01H]  |   | 2  |
| ext = [0]   | Cause Value =<br>[10H (Packet call going dormant),<br>14H (Normal call release),<br>0BH (Handoff Successful),<br>20H (Equipment failure),<br>1AH (Authentication Failure) ] | 3  |
| ⇒ <b>Active Connection Time in Seconds:</b> A9 Element Identifier = [0AH] |   | 1  |
| Length = [04H]  |   | 2  |
| (MSB)   |   | 3  |
| Active Connection Time = [00 00 00 00H – FF FF FF FFH]                    |   | 4  |
| ...   |   | 5  |
|   | (LSB)   | 6  |

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### 3.5 A9-Release-A8 Complete

This A9 interface message is sent from the PCF to the BS to acknowledge completion of the request to release the connection.

| Information Element       | Section Reference | Element Direction | Type           |   |
|---------------------------|-------------------|-------------------|----------------|---|
| A9 Message Type           | 4.2.13            | PCF -> BS         | M              |   |
| Call Connection Reference | 4.2.10            | PCF -> BS         | O              | R |
| Correlation ID            | 4.2.11            | PCF -> BS         | O <sup>a</sup> | C |
| Cause                     | 4.2.3             | PCF -> BS         | O <sup>b</sup> | C |

a. This element shall only be included if it was also included in the A9-Release-A8 message. This element shall be set to the value received in that message.

b. Allowable Cause Values are: "PDSN Resource Unavailable", "PCF resource unavailable", "Equipment failure", and "Packet call going dormant".

The following table shows the bitmap layout for the A9-Release-A8 Complete message.

| 7  | 6                                       | 5 | 4 | 3 | 2 | 1 | 0     | Octet |
|--|---|---|---|---|---|---|-------|-------|
| ⇒ A9 Message Type = [05H]                                  |   |   |   |   |   |   |       | 1     |
| ⇒ Call Connection Reference: A9 Element Identifier = [3FH] |   |   |   |   |   |   |       | 1     |
| Length = [08H]   |   |   |   |   |   |   |       | 2     |
| (MSB)  | Market ID = <any value>                 |   |   |   |   |   | (LSB) | 3     |
| (MSB)  | Generating Entity ID = <any value>      |   |   |   |   |   | (LSB) | 4     |
| (MSB)  | Call Connection Reference = <any value> |   |   |   |   |   | (LSB) | 5     |
| ⇒ Correlation ID: A9 Element Identifier = [13H]            |   |   |   |   |   |   |       | 6     |
| Length = [04H]   |   |   |   |   |   |   |       | 7     |
| (MSB)  | Correlation Value = <any value>         |   |   |   |   |   | (LSB) | 8     |
| ⇒ Cause: A9 Element Identifier = [04H]                     |   |   |   |   |   |   |       | 9     |
| Length = [01H]   |   |   |   |   |   |   |       | 10    |

|           |   |   |
|-----------|---|---|
| ext = [0] | Cause Value =<br>[79H (PDSN Resource Unavailable),<br>32H (PCF resource unavailable),<br>20H (Equipment failure),<br>10H (Packet call going dormant)] | 3 |
|-----------|---|---|

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### 3.6 A9-BS Service Request

This A9 interface message is sent from the PCF to the BS to request re-activation of a packet data service in Dormant state.

| Information Element    | Section Reference | Element Direction | Type           |   |
|------------------------|-------------------|-------------------|----------------|---|
| A9 Message Type        | 4.2.13            | PCF -> BS         | M              |   |
| Correlation ID         | 4.2.11            | PCF -> BS         | O <sup>a</sup> | C |
| Mobile Identity (IMSI) | 4.2.2             | PCF -> BS         | O              | R |
| Mobile Identity (ESN)  | 4.2.2             | PCF -> BS         | O <sup>b</sup> | C |
| Service Option         | 4.2.8             | PCF -> BS         | O              | R |
| Data Count             | 4.2.18            | PCF -> BS         | O <sup>c</sup> | C |

- a. If this element is included in this message, its value shall be returned in the corresponding element in the A9-BS Service Response message sent in response to this message.
- b. This second occurrence of the Mobile Identity element, if included, shall contain the ESN of the MS. Use of the ESN in this message is a network operator decision.
- c. This IE may be included by the PCF to indicate to the BS the amount of data remaining at the PCF that is to be transmitted.

The following table shows the bitmap layout for the A9-BS Service Request message.

| 7   | 6     | 5 | 4 | 3                                  | 2                               | 1 | 0     | Octet |
|---|-------|---|---|------------------------------------|---------------------------------|---|-------|-------|
| ⇒ A9 Message Type = [06H]                               |       |   |   |                                    |                                 |   |       | 1     |
| ⇒ Correlation ID: A9 Element Identifier = [13H]         |       |   |   |                                    |                                 |   |       | 1     |
| Length = [04H]  |       |   |   |                                    |                                 |   |       | 2     |
| (MSB)   | ..... |   |   |                                    |                                 |   |       | 3     |
| Correlation Value = <any value>                         |       |   |   |                                    |                                 |   |       | 4     |
| .....   |       |   |   |                                    |                                 |   |       | 5     |
|   |       |   |   |                                    |                                 |   | (LSB) | 6     |
| ⇒ Mobile Identity (IMSI): A9 Element Identifier = [0DH] |       |   |   |                                    |                                 |   |       | 1     |
| Length = [06H-08H] (10-15 digits)                       |       |   |   |                                    |                                 |   |       | 2     |
| Identity Digit 1 = [0H-9H] (BCD)                        |       |   |   | Odd/even Indicator = [1,0]         | Type of Identity = [110] (IMSI) |   |       | 3     |
| Identity Digit 3 = [0H-9H] (BCD)                        |       |   |   | Identity Digit 2 = [0H-9H] (BCD)   |                                 |   |       | 4     |
| •••   |       |   |   |                                    |                                 |   |       | •••   |
| Identity Digit N+1 = [0H-9H] (BCD)                      |       |   |   | Identity Digit N = [0H-9H] (BCD)   |                                 |   |       | n     |
| = [1111] (if even number of digits)                     |       |   |   | Identity Digit N+2 = [0H-9H] (BCD) |                                 |   |       | n+1   |
| ⇒ Mobile Identity (ESN): A9 Element Identifier = [0DH]  |       |   |   |                                    |                                 |   |       | 1     |

|  |                          |                                |         |
|--|--------------------------|--------------------------------|---------|
| Length = [05H]   |                          |                                | 2       |
| Identity Digit 1 = [0000]                              | Odd/even Indicator = [0] | Type of Identity = [101] (ESN) | 3       |
| (MSB)  |                          |                                | 4       |
| ESN = <any value>                                      |                          |                                | 5       |
|  |                          |                                | 6       |
|  |                          |                                | (LSB) 7 |
| ⇒ <b>Service Option:</b> A9 Element Identifier = [03H] |                          |                                | 1       |
| (MSB)  | Service Option           |                                | 2       |
| = [00 21H (3G High Speed Packet Data)]                 |                          | (LSB)                          | 3       |
| ⇒ <b>Data Count:</b> A9 Element Identifier = [09H]     |                          |                                | 1       |
| Length = [02H]   |                          |                                | 2       |
| Count = <any value>                                    |                          |                                | 3       |
| ...  |                          |                                | 4       |

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### 3.7 A9-BS Service Response

This A9 interface message is sent from the BS to the PCF to acknowledge the call setup.

| Information Element | Section Reference | Element Direction | Type           |   |
|---------------------|-------------------|-------------------|----------------|---|
| A9 Message Type     | 4.2.13            | BS -> PCF         | M              |   |
| Correlation ID      | 4.2.11            | BS -> PCF         | O <sup>a</sup> | C |
| Cause               | 4.2.3             | BS -> PCF         | O <sup>b</sup> | C |

- a. This element shall only be included if it was also included in the A9-BS Service Request message. This element shall be set to the value received in that message.
- b. This element shall only be included if the BS does not grant the A9-BS Service Request. The allowable Cause Values are “MS busy” and “Service option not available”.

The following table shows the bitmap layout for the A9-BS Service Response message.

| 7   | 6  | 5 | 4 | 3 | 2 | 1 | 0     | Octet |
|---|--|---|---|---|---|---|-------|-------|
| ⇒ A9 Message Type = [07H]                       |  |   |   |   |   |   |       | 1     |
| ⇒ Correlation ID: A9 Element Identifier = [13H] |  |   |   |   |   |   |       | 1     |
| Length = [04H]                                  |  |   |   |   |   |   |       | 2     |
| (MSB)   | -----  |   |   |   |   |   |       | 3     |
| Correlation Value = <any value>                 |  |   |   |   |   |   |       | 4     |
| -----   |  |   |   |   |   |   |       | 5     |
|   |  |   |   |   |   |   | (LSB) | 6     |
| ⇒ Cause: A9 Element Identifier = [04H]          |  |   |   |   |   |   |       | 1     |
| Length = [01H]                                  |  |   |   |   |   |   |       | 2     |
| ext = [0]                                       | Cause Value =<br>[ 08H (MS busy),<br>11H (Service option not available)] |   |   |   |   |   |       | 3     |

### 3.8 A9-AL (Air Link) Connected

This A9 interface message is sent from the BS to the PCF to notify that the traffic channel was established when the MS performed Hard Handoff or Fast Handoff.

| Information Element                  | Section Reference | Element Direction | Type           |   |
|--------------------------------------|-------------------|-------------------|----------------|---|
| A9 Message Type                      | 4.2.13            | BS -> PCF         | M              |   |
| Call Connection Reference            | 4.2.10            | BS -> PCF         | O              | R |
| Correlation ID                       | 4.2.11            | BS -> PCF         | O <sup>a</sup> | C |
| A8_Traffic_ID                        | 4.2.16            | BS -> PCF         | O              | R |
| Current PDSN Address                 | 4.2.5             | BS -> PCF         | O <sup>b</sup> | C |
| IS-2000 Service Configuration Record | 4.2.20            | BS -> PCF         | O              | R |
| Service option                       | 4.2.8             | BS -> PCF         | O              | R |
| User Zone ID                         | 4.2.6             | BS -> PCF         | O              | R |
| Quality of Service Parameters        | 4.2.7             | BS -> PCF         | O              | R |
| Access Network Identifiers           | 4.2.19            | BS -> PCF         | O <sup>c</sup> |   |

- a. If this element is included in this message, its value shall be returned in the corresponding element in the A9-AL Connected Ack message sent in response to this message.
- b. This element may be omitted if this message is sent as part of a Fast Handoff because the corresponding A10 connection has already been established. Otherwise, this element shall be included.
- c. The Access Network Identifiers are those of the source PCF communicated by the source BS via the MSC (Handoff Required, Handoff Requested messages).

The following table shows the bitmap layout for the A9-AL Connected message.

| 7  | 6                                       | 5 | 4 | 3 | 2 | 1 | 0     | Octet |
|--|---|---|---|---|---|---|-------|-------|
| ⇒ A9 Message Type = [08H]                                  |   |   |   |   |   |   |       | 1     |
| ⇒ Call Connection Reference: A9 Element Identifier = [3FH] |   |   |   |   |   |   |       | 1     |
| Length = [08H]   |   |   |   |   |   |   |       | 2     |
| (MSB)  | Market ID = <any value>                 |   |   |   |   |   | (LSB) | 3     |
| (LSB)  |   |   |   |   |   |   |       | 4     |
| (MSB)  | Generating Entity ID = <any value>      |   |   |   |   |   | (LSB) | 5     |
| (LSB)  |   |   |   |   |   |   |       | 6     |
| (MSB)  | Call Connection Reference = <any value> |   |   |   |   |   | (LSB) | 7     |
| (LSB)  |   |   |   |   |   |   |       | 8     |
| (LSB)  |   |   |   |   |   |   |       | 9     |
| (LSB)  |   |   |   |   |   |   |       | 10    |
| ⇒ Correlation ID: A9 Element Identifier = [13H]            |   |   |   |   |   |   |       | 1     |
| Length = [04H]   |   |   |   |   |   |   |       | 2     |

|  |  |  |  |   |  |   |  |     |
|--|--|--|--|---|--|---|--|-----|
| (MSB)  |  |  |  |   |  |   |  | 3   |
| Correlation Value = <any value>  |  |  |  |   |  |   |  | 4   |
|  |  |  |  |   |  |   |  | 5   |
|  |  |  |  |   |  |   | (LSB)  | 6   |
| ⇒ <b>A8 Traffic ID:</b> A9 Element Identifier = [08H]                        |  |  |  |   |  |   |  | 1   |
| Length = [0CH]   |  |  |  |   |  |   |  | 2   |
| A8 transport protocol stack = [01H] (GRE/IP)                                 |  |  |  |   |  |   |  | 3   |
| (MSB)  | Protocol Type = [88 81H] (Unstructured byte stream)        |  |  |   |  |   |  | 4   |
|  |  |  |  |   |  |   | (LSB)  | 5   |
| (MSB)  |  |  |  |   |  |   |  | 6   |
| Key = <any value>  |  |  |  |   |  |   |  | 7   |
|  |  |  |  |   |  |   |  | 8   |
|  |  |  |  |   |  |   | (LSB)  | 9   |
| Address Type = [01H] (IPv4)  |  |  |  |   |  |   |  | 10  |
| (MSB)  |  |  |  |   |  |   |  | 11  |
| IP Address = <any value>   |  |  |  |   |  |   |  | 12  |
|  |  |  |  |   |  |   |  | 13  |
|  |  |  |  |   |  |   | (LSB)  | 14  |
| ⇒ <b>Current PDSN Address:</b> A9 Element Identifier = [14H]                 |  |  |  |   |  |   |  | 1   |
| Length = [04H]   |  |  |  |   |  |   |  | 2   |
| (MSB)  |  |  |  |   |  |   |  | 3   |
| Current PDSN Address = <any value>   |  |  |  |   |  |   |  | 4   |
|  |  |  |  |   |  |   |  | 5   |
|  |  |  |  |   |  |   | (LSB)  | 6   |
| ⇒ <b>IS-2000 Service Configuration Record:</b> A9 Element Identifier = [0EH] |  |  |  |   |  |   |  | 1   |
| <b>Bit-Exact Length – Octet Count</b><br>= [00H to FFH]                      |  |  |  |   |  |   |  | 2   |
| Reserved<br>= [0000 0]   |  |  |  | Bit-Exact Length – Fill Bits<br>= [000 to 111]            |  |   |  | 3   |
| (MSB)  |  |  |  |   |  |   |  | 4   |
| <i>IS-2000</i> Service Configuration Record Content<br>= <any value>         |  |  |  |   |  |   |  | ... |
|  | Seventh Fill Bit – if needed = [0 (if used as a fill bit)] | Sixth Fill Bit – if needed = [0 (if used as a fill bit)] | Fifth Fill Bit – if needed = [0 (if used as a fill bit)] | Fourth Fill Bit – if needed = [0 (if used as a fill bit)] | Third Fill Bit – if needed = [0 (if used as a fill bit)] | Second Fill Bit – if needed = [0 (if used as a fill bit)] | First Fill Bit – if needed = [0 (if used as a fill bit)] | k   |
| ⇒ <b>Service Option:</b> A9 Element Identifier = [03H]                       |  |  |  |   |  |   |  | 1   |
| (MSB)  | Service Option   |  |  |   |  |   |  | 2   |

|   |                    |  |   |
|---|--------------------|--|---|
| = [ 00 21H (3G High Speed Packet Data) ]                              |                    | (LSB)  | 3 |
| ⇒ <b>User Zone ID:</b> A9 Element Identifier = [02H]                  |                    |  | 1 |
| Length = [02H]  |                    |  | 2 |
| (MSB)   | UZID = <any value> |  | 3 |
|   |                    | (LSB)  | 4 |
| ⇒ <b>Quality of Service Parameters:</b> A9 Element Identifier = [07H] |                    |  | 1 |
| Length = [01H]  |                    |  | 2 |
| Reserved = [0000]   |                    | Non-Assured Mode Packet Priority = [0000 – 1101] |   |
| ⇒ <b>Access Network Identifiers:</b> A9 Element Identifier = [20H]    |                    |  | 1 |
| Length = [05H]  |                    |  | 2 |
| Reserved = [0]  | (MSB)              | SID = <any value>                                |   |
|   |                    | (LSB)  | 4 |
| (MSB)   | NID = <any value>  |  | 5 |
|   |                    | (LSB)  | 6 |
| PZID = <any value>  |                    |  | 7 |

1

### 3.9 A9-AL (Air Link) Connected Ack

This A9 interface message is sent from the PCF to the BS to acknowledge completion of processing the A8 connection request. In the case of inter-PCF hard handoff without Fast Handoff, this message is sent after establishment of the A10 connection.

| Information Element       | Section Reference | Element Direction | Type           |   |
|---------------------------|-------------------|-------------------|----------------|---|
| A9 Message Type           | 4.2.13            | PCF -> BS         | M              |   |
| Call Connection Reference | 4.2.10            | PCF -> BS         | O              | R |
| Correlation ID            | 4.2.11            | PCF -> BS         | O <sup>a</sup> | C |
| Current PDSN Address      | 4.2.5             | PCF -> BS         | O <sup>b</sup> | C |

- a. This element shall only be included if it was also included in the A9-AL Connected message. This element shall be set to the value received in that message.
- b. This IE may be included if the target PCF could not connect to the PDSN designated in the A9-AL Connected message.

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The following table shows the bitmap layout for the A9-AL Connected Ack message.

| 7   | 6                                       | 5 | 4 | 3 | 2 | 1 | 0     | Octet |    |
|---|---|---|---|---|---|---|-------|-------|----|
| ⇒ <b>A9 Message Type</b> = [09H]                                  |   |   |   |   |   |   |       | 1     |    |
| ⇒ <b>Call Connection Reference:</b> A9 Element Identifier = [3FH] |   |   |   |   |   |   |       | 1     |    |
| Length = [08H]  |   |   |   |   |   |   |       | 2     |    |
| (MSB)   | Market ID = <any value>                 |   |   |   |   |   | (LSB) | 3     |    |
|   |   |   |   |   |   |   |       | 4     |    |
| (MSB)   | Generating Entity ID = <any value>      |   |   |   |   |   | (LSB) | 5     |    |
|   |   |   |   |   |   |   |       | 6     |    |
| (MSB)   | Call Connection Reference = <any value> |   |   |   |   |   | (LSB) | 7     |    |
|   |   |   |   |   |   |   |       | 8     |    |
|   |   |   |   |   |   |   |       | 9     |    |
|   |   |   |   |   |   |   |       | (LSB) | 10 |
| ⇒ <b>Correlation ID:</b> A9 Element Identifier = [13H]            |   |   |   |   |   |   |       | 1     |    |
| Length = [04H]  |   |   |   |   |   |   |       | 2     |    |
| (MSB)   | Correlation Value = <any value>         |   |   |   |   |   | (LSB) | 3     |    |
|   |   |   |   |   |   |   |       | 4     |    |
|   |   |   |   |   |   |   |       | 5     |    |
|   |   |   |   |   |   |   |       | (LSB) | 6  |
| ⇒ <b>Current PDSN Address:</b> A9 Element Identifier = [14H]      |   |   |   |   |   |   |       | 1     |    |
| Length = [04H]  |   |   |   |   |   |   |       | 2     |    |
| (MSB)   | Current PDSN Address = <any value>      |   |   |   |   |   | (LSB) | 3     |    |
|   |   |   |   |   |   |   |       | 4     |    |
|   |   |   |   |   |   |   |       | 5     |    |
|   |   |   |   |   |   |   |       | (LSB) | 6  |

2

### 3.10 A9-AL Disconnected

This A9 interface message is sent from the BS to the PCF to notify that the traffic channel is to be released when a hard handoff is performed.

| Information Element       | Section Reference | Element Direction | Type           |   |
|---------------------------|-------------------|-------------------|----------------|---|
| A9 Message Type           | 4.2.13            | BS -> PCF         | M              |   |
| Call Connection Reference | 4.2.10            | BS -> PCF         | O              | R |
| Correlation ID            | 4.2.11            | BS -> PCF         | O <sup>a</sup> | C |
| A8_Traffic_ID             | 4.2.16            | BS -> PCF         | O              | R |

- a. If this element is included in this message, its value shall be returned in the corresponding element in the A9-AL Disconnected Ack message sent in response to this message.

The following table shows the bitmap layout for the A9-AL Disconnected message.

| 7  | 6   | 5 | 4 | 3 | 2 | 1 | 0     | Octet |
|--|---|---|---|---|---|---|-------|-------|
| ⇒ A9 Message Type = [0AH]                                  |   |   |   |   |   |   |       | 1     |
| ⇒ Call Connection Reference: A9 Element Identifier = [3FH] |   |   |   |   |   |   |       | 1     |
| Length = [08H]   |   |   |   |   |   |   |       | 2     |
| (MSB)  | Market ID = <any value>                             |   |   |   |   |   | (LSB) | 3     |
|  |   |   |   |   |   |   |       | 4     |
| (MSB)  | Generating Entity ID = <any value>                  |   |   |   |   |   | (LSB) | 5     |
|  |   |   |   |   |   |   |       | 6     |
| (MSB)  | Call Connection Reference = <any value>             |   |   |   |   |   | (LSB) | 7     |
|  |   |   |   |   |   |   |       | 8     |
|  |   |   |   |   |   |   |       | 9     |
|  |   |   |   |   |   |   |       | 10    |
| ⇒ Correlation ID: A9 Element Identifier = [13H]            |   |   |   |   |   |   |       | 1     |
| Length = [04H]   |   |   |   |   |   |   |       | 2     |
| (MSB)  | Correlation Value = <any value>                     |   |   |   |   |   | (LSB) | 3     |
|  |   |   |   |   |   |   |       | 4     |
|  |   |   |   |   |   |   |       | 5     |
|  |   |   |   |   |   |   |       | 6     |
| ⇒ A8 Traffic ID: A9 Element Identifier = [08H]             |   |   |   |   |   |   |       | 1     |
| Length = [0CH]   |   |   |   |   |   |   |       | 2     |
| A8 transport protocol stack = [01H] (GRE/IP)               |   |   |   |   |   |   |       | 3     |
| (MSB)  | Protocol Type = [88 81H] (Unstructured byte stream) |   |   |   |   |   | (LSB) | 4     |
|  |   |   |   |   |   |   |       | 5     |
| (MSB)  |   |   |   |   |   |   | (LSB) | 6     |

|                             |       |    |
|-----------------------------|-------|----|
| Key = <any value>           |       | 7  |
|                             |       | 8  |
|                             | (LSB) | 9  |
| Address Type = [01H] (IPv4) |       | 10 |
| (MSB)                       |       | 11 |
| IP Address = <any value>    |       | 12 |
|                             |       | 13 |
|                             | (LSB) | 14 |

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### 3.11 A9-AL Disconnected Ack

This A9 interface message is sent from the PCF to the BS to acknowledge reception of the A9-AL Disconnect message.

| Information Element       | Section Reference | Element Direction | Type           |   |
|---------------------------|-------------------|-------------------|----------------|---|
| A9 Message Type           | 4.2.13            | PCF -> BS         | M              |   |
| Call Connection Reference | 4.2.10            | PCF -> BS         | O              | R |
| Correlation ID            | 4.2.11            | PCF -> BS         | O <sup>a</sup> | C |

- a. This element shall only be included if it was also included in the A9-AL Disconnected message. This element shall be set to the value received in that message.

The following table shows the bitmap layout for the A9-AL Disconnected Ack message.

| 7   | 6                                  | 5 | 4 | 3 | 2 | 1 | 0     | Octet |    |
|---|------------------------------------|---|---|---|---|---|-------|-------|----|
| ⇒ <b>A9 Message Type</b> = [0BH]                                  |                                    |   |   |   |   |   |       | 1     |    |
| ⇒ <b>Call Connection Reference:</b> A9 Element Identifier = [3FH] |                                    |   |   |   |   |   |       | 1     |    |
| Length = [08H]  |                                    |   |   |   |   |   |       | 2     |    |
| (MSB)   | Market ID = <any value>            |   |   |   |   |   | (LSB) | 3     |    |
| (MSB)   | Generating Entity ID = <any value> |   |   |   |   |   | (LSB) | 4     |    |
| (MSB)   | Generating Entity ID = <any value> |   |   |   |   |   | (LSB) | 5     |    |
| (MSB)   | Generating Entity ID = <any value> |   |   |   |   |   | (LSB) | 6     |    |
| (MSB)   | Generating Entity ID = <any value> |   |   |   |   |   | (LSB) | 7     |    |
| Call Connection Reference = <any value>                           |                                    |   |   |   |   |   |       | 8     |    |
| Call Connection Reference = <any value>                           |                                    |   |   |   |   |   |       | 9     |    |
| Call Connection Reference = <any value>                           |                                    |   |   |   |   |   |       | (LSB) | 10 |
| ⇒ <b>Correlation ID:</b> A9 Element Identifier = [13H]            |                                    |   |   |   |   |   |       | 1     |    |
| Length = [04H]  |                                    |   |   |   |   |   |       | 2     |    |
| (MSB)   | Correlation Value = <any value>    |   |   |   |   |   | (LSB) | 3     |    |
| Correlation Value = <any value>                                   |                                    |   |   |   |   |   |       | 4     |    |
| Correlation Value = <any value>                                   |                                    |   |   |   |   |   |       | 5     |    |
| Correlation Value = <any value>                                   |                                    |   |   |   |   |   |       | (LSB) | 6  |

### 3.12 A9-Short Data Delivery

This message is sent from the BS to the PCF when a short data burst is received from a mobile. It is sent from the PCF to the BS when a small amount of data is received for a mobile when it's packet data service instance is dormant.

| Information Element    | Section Reference | Element Direction | Type           |   |
|------------------------|-------------------|-------------------|----------------|---|
| A9 Message Type        | 4.2.13            | PCF <-> BS        | M              |   |
| Correlation ID         | 4.2.11            | PCF -> BS         | O <sup>a</sup> | C |
| Mobile Identity (IMSI) | 4.2.2             | PCF <-> BS        | O              | R |
| Mobile Identity (ESN)  | 4.2.2             | PCF <-> BS        | O <sup>b</sup> | C |
| SR_ID                  | 4.2.4             | PCF <-> BS        | O              | R |
| Data Count             | 4.2.18            | PCF -> BS         | O <sup>c</sup> | C |
| ADDS User Part         | 4.2.9             | PCF <-> BS        | O <sup>d</sup> | R |

- a. If this element is included, its value shall be returned in the corresponding element in the A9-Short Data Ack message from the BS.
- b. This second occurrence of the Mobile Identity element, if included, shall contain the ESN of the MS. Use of the ESN in this message is a network operator decision.
- c. This element is included in this message when sent from the PCF to the BS and indicates the number of additional bytes of data queued at the PCF and waiting to be sent to a specific mobile.
- d. Contains the packet data received from the PDSN or an MS in a SDB format as specified in [28].

The following table shows the bitmap layout for the A9-Short Data Delivery message.

| 7   | 6     | 5 | 4 | 3                                | 2                                  | 1 | 0     | Octet |
|---|-------|---|---|----------------------------------|------------------------------------|---|-------|-------|
| ⇒ A9 Message Type = [0CH]                               |       |   |   |                                  |                                    |   |       | 1     |
| ⇒ Correlation ID: A8/A9 Element Identifier = [13H]      |       |   |   |                                  |                                    |   |       | 1     |
| Length = [04H]  |       |   |   |                                  |                                    |   |       | 2     |
| (MSB)   | ----- |   |   |                                  |                                    |   |       | 3     |
| Correlation Value = <any value>                         |       |   |   |                                  |                                    |   |       | 4     |
| -----   |       |   |   |                                  |                                    |   |       | 5     |
|   |       |   |   |                                  |                                    |   | (LSB) | 6     |
| ⇒ Mobile Identity (IMSI): A9 Element Identifier = [0DH] |       |   |   |                                  |                                    |   |       | 1     |
| Length = [06H-08H] (10-15 digits)                       |       |   |   |                                  |                                    |   |       | 2     |
| Identity Digit 1 = [0H-9H] (BCD)                        |       |   |   | Odd/even<br>Indicator<br>= [1,0] | Type of Identity<br>= [110] (IMSI) |   |       | 3     |
| Identity Digit 3 = [0H-9H] (BCD)                        |       |   |   | Identity Digit 2 = [0H-9H] (BCD) |                                    |   |       | 4     |
| •••   |       |   |   |                                  |                                    |   |       | •••   |

|   |  |                                |   |
|---|--|--------------------------------|---|
| Identity Digit N+1 = [0H-9H] (BCD)                            | Identity Digit N = [0H-9H] (BCD)             | n                              |   |
| = [1111] (if even number of digits)                           | Identity Digit N+2 = [0H-9H] (BCD)           | n+1                            |   |
| ⇒ <b>Mobile Identity (ESN):</b> A9 Element Identifier = [0DH] |  | 1                              |   |
| Length = [05H]  |  | 2                              |   |
| Identity Digit 1 = [0000]                                     | Odd/even Indicator = [0]                     | Type of Identity = [101] (ESN) | 3 |
| (MSB)   |  |                                | 4 |
| ESN = <any value>   |  |                                | 5 |
|   |  |                                | 6 |
|   |  | (LSB)                          | 7 |
| ⇒ <b>SR_ID:</b> A9 Element Identifier = [0BH]                 |  | 1                              |   |
| Length = [01H]  |  | 2                              |   |
| Reserved = [0000 0]   | IS-2000 SR_ID = [001 - 011]                  |                                | 3 |
| ⇒ <b>Data Count:</b> A9 Element Identifier = [09H]            |  | 1                              |   |
| Length = [02H]  |  | 2                              |   |
| Count = <any value>   |  | 3                              |   |
| ...   |  | 4                              |   |
| ⇒ <b>ADDS User Part:</b> A9 Element Identifier = [3DH]        |  | 1                              |   |
| Length = <variable>   |  | 2                              |   |
| Reserved = [00]   | Data Burst Type = [ 06H (Short Data Burst) ] |                                | 3 |
| (MSB)   | Application Data Message = <any value>       |                                | 4 |
| ...   |  | ...                            |   |
|   |  | (LSB)                          | n |

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### 3.13 A9-Short Data Ack

This A9 interface message is sent from the BS to the PCF to acknowledge reception of the A9-Short Data Delivery message and to indicate to the PCF whether the data was accepted for delivery to the mobile.

| Information Element    | Section Reference | Element Direction | Type           |   |
|------------------------|-------------------|-------------------|----------------|---|
| A9 Message Type        | 4.2.13            | BS->PCF           | M              |   |
| Correlation ID         | 4.2.11            | BS->PCF           | O <sup>a</sup> | C |
| Mobile Identity (IMSI) | 4.2.2             | BS->PCF           | O              | R |
| Mobile Identity (ESN)  | 4.2.2             | BS->PCF           | O <sup>b</sup> | C |
| SR_ID                  | 4.2.4             | BS->PCF           | O              | R |
| Cause                  | 4.2.3             | BS->PCF           | O <sup>c</sup> | R |

- a. If this element is included, it's value shall be set to the value of the corresponding element in the A9-Short Data Delivery message from the PCF.
- b. This second occurrence of the Mobile Identity element, if included, shall contain the ESN of the MS. Use of the ESN in this message is a network operator decision.
- c. The Cause Value indicates to the PCF whether a short data burst is to be sent to the mobile.

The following table shows the bitmap layout for the A9-Short Data Ack message.

| 7   | 6     | 5 | 4 | 3                                  | 2                               | 1 | 0     | Octet |
|---|-------|---|---|------------------------------------|---------------------------------|---|-------|-------|
| ⇒ A9 Message Type = [0DH]                               |       |   |   |                                    |                                 |   |       | 1     |
| ⇒ Correlation ID: A8/A9 Element Identifier = [13H]      |       |   |   |                                    |                                 |   |       | 1     |
| Length = [04H]  |       |   |   |                                    |                                 |   |       | 2     |
| (MSB)   | ..... |   |   |                                    |                                 |   |       | 3     |
| Correlation Value = <any value>                         |       |   |   |                                    |                                 |   |       | 4     |
| .....   |       |   |   |                                    |                                 |   |       | 5     |
| .....   |       |   |   |                                    |                                 |   | (LSB) | 6     |
| ⇒ Mobile Identity (IMSI): A9 Element Identifier = [0DH] |       |   |   |                                    |                                 |   |       | 1     |
| Length = [06H-08H] (10-15 digits)                       |       |   |   |                                    |                                 |   |       | 2     |
| Identity Digit 1 = [0H-9H] (BCD)                        |       |   |   | Odd/even Indicator = [1,0]         | Type of Identity = [110] (IMSI) |   |       | 2     |
| Identity Digit 3 = [0H-9H] (BCD)                        |       |   |   | Identity Digit 2 = [0H-9H] (BCD)   |                                 |   |       | 3     |
| .....   |       |   |   |                                    |                                 |   |       | ...   |
| Identity Digit N+1 = [0H-9H] (BCD)                      |       |   |   | Identity Digit N = [0H-9H] (BCD)   |                                 |   |       | n     |
| = [1111] (if even number of digits)                     |       |   |   | Identity Digit N+2 = [0H-9H] (BCD) |                                 |   |       | n+1   |
| ⇒ Mobile Identity (ESN): A9 Element Identifier = [0DH]  |       |   |   |                                    |                                 |   |       | 1     |

|   |  |                                   |   |
|---|--|-----------------------------------|---|
| <b>Length = [05H]</b>                         |  |                                   | 2 |
| Identity Digit 1 = [0000]                     | Odd/even<br>Indicator<br>= [0]   | Type of Identity<br>= [101] (ESN) | 3 |
| (MSB)   |  |                                   | 4 |
| -----<br>ESN = <any value><br>-----           |  |                                   | 5 |
|   |  |                                   | 6 |
| -----<br>  (LSB)                              |  |                                   | 7 |
| ⇒ <b>SR_ID:</b> A9 Element Identifier = [0BH] |  |                                   | 1 |
| Length = [01H]                                |  |                                   | 2 |
| Reserved = [0000 0]                           |  | IS-2000 SR_ID = [001 - 011]       | 3 |
| ⇒ <b>Cause:</b> A9 Element Identifier = [04H] |  |                                   | 1 |
| Length = [01H]                                |  |                                   | 2 |
| ext =<br>[0]                                  | Cause Value =<br>[13H (Successful Operation),<br>16H (Initiate Re-activation of Packet Data call)] |                                   | 3 |

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### 3.14 A9-Update-A8

This A9 interface message is sent from the BS to the PCF to indicate a change to the session airlink parameters.

| Information Element                  | Section Reference | Element Direction | Type             |   |
|--------------------------------------|-------------------|-------------------|------------------|---|
| A9 Message Type                      | 4.2.13            | BS -> PCF         | M                |   |
| Call Connection Reference            | 4.2.10            | BS -> PCF         | O                | R |
| Correlation ID                       | 4.2.11            | BS -> PCF         | O <sup>a</sup>   | C |
| Mobile Identity (IMSI)               | 4.2.2             | BS -> PCF         | O                | R |
| Mobile Identity (ESN)                | 4.2.2             | BS -> PCF         | O <sup>b,c</sup> | C |
| IS-2000 Service Configuration Record | 4.2.20            | BS -> PCF         | O <sup>c</sup>   | C |
| Service Option                       | 4.2.8             | BS -> PCF         | O <sup>c</sup>   | C |
| User Zone ID                         | 4.2.6             | BS -> PCF         | O <sup>c</sup>   | C |
| Quality of Service Parameters        | 4.2.7             | BS -> PCF         | O <sup>c</sup>   | C |
| Cause                                | 4.2.3             | BS -> PCF         | O                | R |

- a. If this element is included in this message, its value shall be returned in the corresponding element in the A9-Update-A8-Ack message sent in response to this message.
- b. This second occurrence of the Mobile Identity element, if included, shall contain the ESN of the MS. Use of the ESN in this message is a network operator decision.
- c. These elements are required unless the message is used to indicate Dormant Power down or Authentication Failure.

The following table shows the bitmap layout for the A9-Update-A8 message.

| 7  | 6                                       | 5 | 4 | 3 | 2 | 1 | 0     | Octet |
|--|---|---|---|---|---|---|-------|-------|
| ⇒ A9 Message Type = [03H]                                  |   |   |   |   |   |   |       | 1     |
| ⇒ Call Connection Reference: A9 Element Identifier = [3FH] |   |   |   |   |   |   |       | 1     |
| Length = [08H]   |   |   |   |   |   |   |       | 2     |
| (MSB)  | Market ID = <any value>                 |   |   |   |   |   | (LSB) | 3     |
| Generating Entity ID = <any value>                         |   |   |   |   |   |   |       | 4     |
| (MSB)  | Call Connection Reference = <any value> |   |   |   |   |   | (LSB) | 5     |
| Correlation ID: A9 Element Identifier = [13H]              |   |   |   |   |   |   |       | 6     |
| (MSB)  | Length = [04H]                          |   |   |   |   |   | (LSB) | 7     |
| Correlation ID: A9 Element Identifier = [13H]              |   |   |   |   |   |   |       | 8     |
| Length = [04H]   |   |   |   |   |   |   |       | 9     |
| Correlation ID: A9 Element Identifier = [13H]              |   |   |   |   |   |   |       | 10    |
| Length = [04H]   |   |   |   |   |   |   |       | 11    |

|  |  |  |  |   |  |   |  |       |
|--|--|--|--|---|--|---|--|-------|
| (MSB)  |  |  |  |   |  |   |  | 3     |
| Correlation Value = <any value>  |  |  |  |   |  |   |  | 4     |
|  |  |  |  |   |  |   |  | 5     |
|  |  |  |  |   |  |   | (LSB)  | 6     |
| ⇒ <b>Mobile Identity (IMSI): A9 Element Identifier = [0DH]</b>               |  |  |  |   |  |   |  | 1     |
| Length = [06H-08H] (10-15 digits)  |  |  |  |   |  |   |  | 2     |
| Identity Digit 1 = [0H-9H] (BCD)   |  |  | Odd/even Indicator = [1,0]                               | Type of Identity = [110] (IMSI)                           |  |   |  | 2     |
| Identity Digit 3 = [0H-9H] (BCD)   |  |  | Identity Digit 2 = [0H-9H] (BCD)                         |   |  |   |  | 3     |
| • • •  |  |  |  |   |  |   |  | • • • |
| Identity Digit N+1 = [0H-9H] (BCD)   |  |  | Identity Digit N = [0H-9H] (BCD)                         |   |  |   |  | n     |
| = [1111] (if even number of digits)  |  |  | Identity Digit N+2 = [0H-9H] (BCD)                       |   |  |   |  | n+1   |
| ⇒ <b>Mobile Identity (ESN): A9 Element Identifier = [0DH]</b>                |  |  |  |   |  |   |  | 1     |
| Length = [05H]   |  |  |  |   |  |   |  | 2     |
| Identity Digit 1 = [0000]  |  |  | Odd/even Indicator = [0]                                 | Type of Identity = [101] (ESN)                            |  |   |  | 3     |
| (MSB)  |  |  |  |   |  |   |  | 4     |
| ESN = <any value>  |  |  |  |   |  |   |  | 5     |
|  |  |  |  |   |  |   |  | 6     |
|  |  |  |  |   |  |   | (LSB)  | 7     |
| ⇒ <b>IS-2000 Service Configuration Record: A9 Element Identifier = [0EH]</b> |  |  |  |   |  |   |  | 1     |
| Bit-Exact Length – Octet Count = <variable>                                  |  |  |  |   |  |   |  | 2     |
| Reserved = [ 0000 0 ]  |  |  |  | Bit-Exact Length – Fill Bits = [ 000 – 111 ]              |  |   |  | 3     |
| (MSB)  |  |  |  |   |  |   |  | 4     |
| <i>IS-2000 Service Configuration Record Content</i> = <any value>            |  |  |  |   |  |   |  | • • • |
|  | Seventh Fill Bit – if needed = [0 (if used as a fill bit)] | Sixth Fill Bit – if needed = [0 (if used as a fill bit)] | Fifth Fill Bit – if needed = [0 (if used as a fill bit)] | Fourth Fill Bit – if needed = [0 (if used as a fill bit)] | Third Fill Bit – if needed = [0 (if used as a fill bit)] | Second Fill Bit – if needed = [0 (if used as a fill bit)] | First Fill Bit – if needed = [0 (if used as a fill bit)] | k     |
| ⇒ <b>Service Option: A9 Element Identifier = [03H]</b>                       |  |  |  |   |  |   |  | 1     |
| (MSB)  | Service Option   |  |  |   |  |   |  | 2     |
| = [ 00 21H (3G High Speed Packet Data ) ]                                    |  |  |  |   |  |   | (LSB)  | 3     |
| ⇒ <b>User Zone ID: A9 Element Identifier = [02H]</b>                         |  |  |  |   |  |   |  | 1     |
| Length = [02H]   |  |  |  |   |  |   |  | 2     |
| (MSB)  | UZID = <any value>   |  |  |   |  |   |  | 3     |

|                   |   |   |   |
|-------------------|---|---|---|
|                   |   | (LSB)   | 4 |
| ⇒                 |   | <b>Quality of Service Parameters: A9 Element Identifier = [07H]</b> | 1 |
|                   |   | <b>Length = [01H]</b>   | 2 |
| Reserved = [0000] |   | Non-Assured Mode Packet Priority = [0000 – 1101]                    | 3 |
| ⇒                 |   | <b>Cause: A9 Element Identifier = [04H]</b>                         | 1 |
|                   |   | <b>Length = [01H]</b>   | 2 |
| Ext=<br>[0]       | Cause Value =<br>[19H (Power down from dormant state),<br>1CH (update accounting: late traffic channel setup),<br>1EH (update accounting: parameter change),<br>1AH (Authentication Failure)] |   | 3 |

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**3.15 A9-Update-A8-Ack**

This A9 interface message is sent from the PCF to the BS to acknowledge the change to the session airlink parameters.

| Information Element       | Section Reference | Element Direction | Type           |   |
|---------------------------|-------------------|-------------------|----------------|---|
| A9 Message Type           | 4.2.13            | PCF->BS           | M              |   |
| Call Connection Reference | 4.2.10            | PCF->BS           | O              | R |
| Correlation ID            | 4.2.11            | PCF->BS           | O <sup>a</sup> | C |

- a. This element shall only be included if it was also included in the A9-Update-A8 message. This element shall be set to the value received in that message.

The following table shows the bitmap layout for the A9-Update Ack message.

| 7  | 6                                       | 5 | 4 | 3 | 2 | 1 | 0     | Octet |
|--|---|---|---|---|---|---|-------|-------|
| ⇒ A9 Message Type = [03H]                                  |   |   |   |   |   |   |       | 1     |
| ⇒ Call Connection Reference: A9 Element Identifier = [3FH] |   |   |   |   |   |   |       | 1     |
| Length = [08H]   |   |   |   |   |   |   |       | 2     |
| (MSB)  | Market ID = <any value>                 |   |   |   |   |   | (LSB) | 3     |
| (MSB)  | Generating Entity ID = <any value>      |   |   |   |   |   | (LSB) | 4     |
| (MSB)  | Call Connection Reference = <any value> |   |   |   |   |   | (LSB) | 5     |
| ⇒ Correlation ID: A9 Element Identifier = [13H]            |   |   |   |   |   |   |       | 6     |
| Length = [04H]   |   |   |   |   |   |   |       | 7     |
| (MSB)  | Correlation Value = <any value>         |   |   |   |   |   | (LSB) | 8     |
|  |   |   |   |   |   |   |       | 9     |
|  |   |   |   |   |   |   |       | 10    |
|  |   |   |   |   |   |   |       | 11    |
|  |   |   |   |   |   |   |       | 12    |
|  |   |   |   |   |   |   |       | 13    |
|  |   |   |   |   |   |   |       | 14    |
|  |   |   |   |   |   |   |       | 15    |
|  |   |   |   |   |   |   |       | 16    |

### 3.16 A9-Version Info

This A9 interface message is sent from the PCF to the BS, or the BS to the PCF, when the sending entity requires the software version information from the receiving entity.

| Information Element | Section Reference | Element Direction | Type           |   |
|---------------------|-------------------|-------------------|----------------|---|
| A9 Message Type     | 4.2.13            | PCF<->BS          | M              |   |
| Correlation ID      | 4.2.11            | PCF<->BS          | O <sup>a</sup> | C |
| Cause               | 4.2.3             | PCF<->BS          | O <sup>b</sup> | C |
| Software Version    | 4.2.21            | PCF<->BS          | O              | R |

- a. If this element is included in this message, its value shall be returned in the corresponding element in the A9-Version Info Ack message sent in response to this message.
- b. This element shall be included if the message is being sent as the result of a reset at the sending entity.

The following table shows the bitmap layout for the A9-Version Info message:

| 7  | 6   | 5 | 4 | 3 | 2 | 1 | 0 | Octet |
|--|---|---|---|---|---|---|---|-------|
| ⇒ <b>A9 Message Type</b> = [10H]   |   |   |   |   |   |   |   | 1     |
| ⇒ <b>Correlation ID: A9 Element Identifier</b> = [13H]                         |   |   |   |   |   |   |   | 1     |
| Length = [04H]   |   |   |   |   |   |   |   | 2     |
| (MSB)  | .....   |   |   |   |   |   |   | 3     |
| Correlation Value = <any value>  |   |   |   |   |   |   |   | 4     |
| .....  |   |   |   |   |   |   |   | 5     |
| ..... (LSB)  |   |   |   |   |   |   |   | 6     |
| ⇒ <b>Cause: A9 Element Identifier</b> = [04H]                                  |   |   |   |   |   |   |   | 1     |
| Length = [01H]   |   |   |   |   |   |   |   | 2     |
| ext = [0]  | Cause Value =<br>[07H (OAM&P Intervention),<br>20H (Equipment failure)] |   |   |   |   |   |   | 3     |
| ⇒ <b>Software Version: A9 Element Identifier</b> = [31H]                       |   |   |   |   |   |   |   | 1     |
| Length = <variable>  |   |   |   |   |   |   |   | 2     |
| <b>IOS Major Revision Level (X)</b> = [04H]                                    |   |   |   |   |   |   |   | 3     |
| <b>IOS Minor Revision Level (Y)</b> = [02H]                                    |   |   |   |   |   |   |   | 4     |
| <b>IOS Point Release Level (Z)</b> = [00H]                                     |   |   |   |   |   |   |   | 5     |
| <b>Manufacturer/Carrier Software Information</b> = <printable ASCII character> |   |   |   |   |   |   |   | 6     |
| ...  |   |   |   |   |   |   |   | ...   |
| <b>Manufacturer/Carrier Software Information</b> = <printable ASCII character> |   |   |   |   |   |   |   | n     |

### 3.17 A9-Version Info Ack

This A9 interface message is sent from the PCF to the BS, or BS to PCF, in response to the A9-Version Info message. The message includes the software version information from the receiving entity.

| Information Element | Section Reference | Element Direction | Type           |   |
|---------------------|-------------------|-------------------|----------------|---|
| A9 Message Type     | 4.2.13            | PCF<->BS          | M              |   |
| Correlation ID      | 4.2.11            | PCF<->BS          | O <sup>a</sup> | C |
| Software Version    | 4.2.21            | PCF<->BS          | O              | R |

- a. This element is included in this message if it was sent in the A9-Version Info message. Its value shall be set to the same value as in the A9-Version Info message.

The following table shows the bitmap layout for the A9-Version Info Ack message:

| 7   | 6     | 5 | 4 | 3 | 2 | 1 | 0     | Octet |
|---|-------|---|---|---|---|---|-------|-------|
| ⇒ A9 Message Type = [11H]   |       |   |   |   |   |   |       | 1     |
| ⇒ Correlation ID: A9 Element Identifier = [13H]                         |       |   |   |   |   |   |       | 1     |
| Length = [04H]  |       |   |   |   |   |   |       | 2     |
| (MSB)   | ..... |   |   |   |   |   |       | 3     |
| Correlation Value = <any value>   |       |   |   |   |   |   |       | 4     |
| .....   |       |   |   |   |   |   |       | 5     |
| .....   |       |   |   |   |   |   | (LSB) | 6     |
| ⇒ Software Version: A9 Element Identifier = [31H]                       |       |   |   |   |   |   |       | 1     |
| Length = <variable>   |       |   |   |   |   |   |       | 2     |
| IOS Major Revision Level (X) = [04H]                                    |       |   |   |   |   |   |       | 3     |
| IOS Minor Revision Level (Y) = [02H]                                    |       |   |   |   |   |   |       | 4     |
| IOS Point Release Level (Z) = [00H]                                     |       |   |   |   |   |   |       | 5     |
| Manufacturer/Carrier Software Information = <printable ASCII character> |       |   |   |   |   |   |       | 6     |
| ...   |       |   |   |   |   |   |       | ...   |
| Manufacturer/Carrier Software Information = <printable ASCII character> |       |   |   |   |   |   |       | n     |

## 4.0 Information Element Definitions

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This section contains the coding of the information elements used in the messages defined in Section 3.0.

The definitions in the following subsections are for informational purposes only. Parameter usage may vary per message in that only a subset of the defined values may be applicable in a particular message. Therefore, the allowed values are specified per message in the subsections of section 3.0.

## 4.1 Generic Information Element Encoding

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### 4.1.1 Conventions

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The following conventions are assumed for the sequence of transmission of bits and bytes:

- Each bit position is marked as 0 to 7. Bit 0 is the least significant bit and is transmitted first.
- In a message, octets are identified by number. Octet 1 is transmitted first, then octet 2, etc.

For variable length elements, a length indicator is included. This indicates the number of octets following in the element.

The definition of whether an information element is mandatory or optional is specified in Section 3.0.

The Information Element Identifier is included for all cases of signaling messages on the A9 Interface.

All reserved bits are set to 0, unless otherwise indicated.

For future expansion purposes, some of these information elements have fields within them that have been reserved.

### 4.1.2 Information Element Identifiers

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The following tables contain lists of all elements that make up the messages defined in Section 3.0. The tables include the Information Element Identifier (IEI) coding which distinguishes one element from another. The tables also include reference to the section where the element coding can be found.

1 Elements used in messages on the A9 interface are contained in Table 4.1.2-1 sorted by  
 2 element name and in Table 4.1.2-2 sorted by identifier value.

3 **Table 4.1.2-1 A9 Information Element Identifiers Sorted by Identifier Name**

| Element Name                         | Identifier | Reference |
|--------------------------------------|------------|-----------|
| A8 Traffic ID                        | 08H        | 4.2.16    |
| A9 Cell Identifier                   | 06H        | 4.2.15    |
| A9 Indicators                        | 05H        | 4.2.17    |
| Access Network Identifiers           | 20H        | 4.2.19    |
| Active Connection Time in Seconds    | 0AH        | 4.2.1     |
| ADDS User Part                       | 3DH        | 4.2.9     |
| Anchor P-P Address                   | 40H        | 4.2.12    |
| Anchor PDSN Address                  | 30H        | 4.2.22    |
| Call Connection Reference            | 3FH        | 4.2.10    |
| Cause                                | 04H        | 4.2.3     |
| CON_REF                              | 01H        | 4.2.14    |
| Correlation ID                       | 13H        | 4.2.11    |
| Current PDSN Address                 | 14H        | 4.2.5     |
| Data Count                           | 09H        | 4.2.18    |
| IS-2000 Service Configuration Record | 0EH        | 4.2.20    |
| Mobile Identity                      | 0DH        | 4.2.2     |
| Quality of Service Parameters        | 07H        | 4.2.7     |
| Service Option                       | 03H        | 4.2.8     |
| Software Version                     | 31H        | 4.2.21    |
| SR_ID                                | 0BH        | 4.2.4     |
| User Zone ID                         | 02H        | 4.2.6     |

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**Table 4.1.2-2 A9 Information Element Identifiers Sorted by Identifier Value**

| <b>Element Name</b>                  | <b>Identifier</b> | <b>Reference</b> |
|--------------------------------------|-------------------|------------------|
| CON_REF                              | 01H               | 4.2.14           |
| User Zone ID                         | 02H               | 4.2.6            |
| Service Option                       | 03H               | 4.2.8            |
| Cause                                | 04H               | 4.2.3            |
| A9 Indicators                        | 05H               | 4.2.17           |
| A9 Cell Identifier                   | 06H               | 4.2.15           |
| Quality of Service Parameters        | 07H               | 4.2.7            |
| A8 Traffic ID                        | 08H               | 4.2.16           |
| Data Count                           | 09H               | 4.2.18           |
| Active Connection Time in Seconds    | 0AH               | 4.2.1            |
| SR_ID                                | 0BH               | 4.2.4            |
| Mobile Identity                      | 0DH               | 4.2.2            |
| IS-2000 Service Configuration Record | 0EH               | 4.2.20           |
| Correlation ID                       | 13H               | 4.2.11           |
| Current PDSN Address                 | 14H               | 4.2.5            |
| Access Network Identifiers           | 20H               | 4.2.19           |
| Anchor PDSN Address                  | 30H               | 4.2.22           |
| Software Version                     | 31H               | 4.2.21           |
| ADDS User Part                       | 3DH               | 4.2.9            |
| Call Connection Reference            | 3FH               | 4.2.10           |
| Anchor P-P Address                   | 40H               | 4.2.12           |

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### 4.1.3 Additional Coding and Interpretation Rules for Information Elements

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Information elements shall always use the same Information Element Identifier for all occurrences on a specific A9 Interface. Insofar as possible, the same Information Element Identifier shall be used for a given information element when it is used on more than one of the A9 Interface.

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The order of appearance for each information element which is mandatory or optional in a message is laid down in the definition of the message.

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Where the description of the information element in this standard contains reserved bits, these bits are indicated as being set to '0'. In order to allow compatibility with future implementation, messages shall not be rejected simply because a reserved bit is set to '1'.

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An optional variable length information element may be present, but empty. For example, a message may contain an information element, the content of which is zero length. This shall be interpreted by the receiver as equivalent to that information element being absent.

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Some existing elements make use of an extension bit mechanism that allows the size of the information element to be increased. This mechanism consists of the use of the high order bit (bit 7) of an octet as an "extension bit." When an octet within an information element has bit 7 defined as an extension bit, then the value '0' in that bit position indicates that the following octet is an extension of the current octet. When the value is '1', there is no extension.

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#### 4.1.4 Cross Reference of Information Elements With Messages

The following table provides a cross reference between the elements defined in this specification and the messages defined herein.

**Table 4.1.4-1 Cross Reference of Information Elements With Messages**

| Information Element               |        | Used in These Messages     |      |
|-----------------------------------|--------|----------------------------|------|
| A8 Traffic_ID                     | 4.2.16 | A9-Setup-A8                | 3.1  |
|                                   |        | A9-AL Connected            | 3.8  |
|                                   |        | A9-AL Disconnected         | 3.10 |
|                                   |        | A9-Connect-A8              | 3.2  |
|                                   |        | A9-Disconnect-A8           | 3.3  |
|                                   |        | A9-Release-A8              | 3.4  |
| A9 Cell Identifier                | 4.2.15 | A9-Setup-A8                | 3.1  |
| A9 Indicators                     | 4.2.17 | A9-Setup-A8                | 3.1  |
| A9 Message Type                   | 4.2.13 | A9-Setup-A8                | 3.1  |
|                                   |        | A9-AL Connected            | 3.8  |
|                                   |        | A9-AL Connected Ack        | 3.9  |
|                                   |        | A9-AL Disconnected         | 3.10 |
|                                   |        | A9-AL Disconnected Ack     | 3.11 |
|                                   |        | A9-BS Service Request      | 3.6  |
|                                   |        | A9-BS Service Response     | 3.7  |
|                                   |        | A9-Connect-A8              | 3.2  |
|                                   |        | A9-Disconnect-A8           | 3.3  |
|                                   |        | A9-Release-A8              | 3.4  |
|                                   |        | A9-Release-A8 Complete     | 3.5  |
|                                   |        | A9-Short Data Delivery     | 3.12 |
|                                   |        | A9-Short Data Delivery Ack | 3.13 |
|                                   |        | A9-Update-A8               | 3.14 |
|                                   |        | A9-Update-A8 Ack           | 3.15 |
| A9-Version Info                   | 3.16   |                            |      |
| A9-Version Info Ack               | 3.17   |                            |      |
| Access Network Identifier         | 4.2.19 | A9-Setup-A8                | 3.1  |
|                                   |        | A9-AL Connected            | 3.8  |
| Active Connection Time in Seconds | 4.2.1  | A9-Release-A8              | 3.4  |
| Anchor P-P Address                | 4.2.12 | A9-Setup-A8                | 3.1  |
|                                   |        | A9-Connect-A8              | 3.2  |
| Anchor PDSN Address               | 4.2.22 | A9-Setup-A8                | 3.1  |
|                                   |        | A9-Connect-A8              | 3.2  |

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**Table 4.1.4-1 (Cont.) Cross Reference of Information Elements With Messages**

| <b>Information Element</b> |        | <b>Used in These Messages</b> |      |
|----------------------------|--------|-------------------------------|------|
| ADDS User Part             | 4.2.9  | A9-Short Data Delivery        | 3.12 |
| Call Connection Reference  | 4.2.10 | A9-AL Connected               | 3.8  |
|                            |        | A9-AL Connected Ack           | 3.9  |
|                            |        | A9-AL Disconnected            | 3.10 |
|                            |        | A9-AL Disconnected Ack        | 3.11 |
|                            |        | A9-Connect-A8                 | 3.2  |
|                            |        | A9-Disconnect-A8              | 3.3  |
|                            |        | A9-Setup-A8                   | 3.1  |
|                            |        | A9-Release-A8                 | 3.4  |
|                            |        | A9-Release-A8 Complete        | 3.5  |
|                            |        | A9-Update-A8                  | 3.14 |
|                            |        | A9-Update-A8 Ack              | 3.15 |
| Cause                      | 4.2.3  | A9-Connect-A8                 | 3.2  |
|                            |        | A9-Disconnect-A8              | 3.3  |
|                            |        | A9-Release-A8                 | 3.4  |
|                            |        | A9-Release-A8 Complete        | 3.5  |
|                            |        | A9-BS Service Response        | 3.7  |
|                            |        | A9-Short Data Ack             | 3.13 |
|                            |        | A9-Update-A8                  | 3.14 |
|                            |        | A9-Version Info               | 3.16 |
| CON_REF                    | 4.2.14 | A9-Setup-A8                   | 3.1  |
|                            |        | A9-Connect-A8                 | 3.2  |
|                            |        | A9-Disconnect-A8              | 3.3  |
|                            |        | A9-Release-A8                 | 3.4  |

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**Table 4.1.4-1 (Cont.) Cross Reference of Information Elements With Messages**

| <b>Information Element</b>           |        | <b>Used in These Messages</b> |      |
|--------------------------------------|--------|-------------------------------|------|
| Correlation ID                       | 4.2.11 | A9-AL Disconnected Ack        | 3.11 |
|                                      |        | A9-Short Data Delivery        | 3.12 |
|                                      |        | A9-Short Data Delivery Ack    | 3.13 |
|                                      |        | A9-Setup-A8                   | 3.1  |
|                                      |        | A9-Connect-A8                 | 3.2  |
|                                      |        | A9-Disconnect-A8              | 3.3  |
|                                      |        | A9-Release-A8                 | 3.4  |
|                                      |        | A9-Release-A8 Complete        | 3.5  |
|                                      |        | A9-BS Service Request         | 3.6  |
|                                      |        | A9-BS Service Response        | 3.7  |
|                                      |        | A9-AL Connected               | 3.8  |
|                                      |        | A9-AL Connected Ack           | 3.9  |
|                                      |        | A9-AL Disconnected            | 3.10 |
|                                      |        | A9-Update-A8                  | 3.14 |
|                                      |        | A9-Update-A8 Ack              | 3.15 |
|                                      |        | A9-Version Info               | 3.16 |
| A9-Version Info Ack                  | 3.17   |                               |      |
| Current PDSN Address                 | 4.2.5  | A9-Connect-A8                 | 3.2  |
|                                      |        | A9-AL Connected               | 3.8  |
|                                      |        | A9-AL Connected Ack           | 3.9  |
| Data Count                           | 4.2.18 | A9-BS Service Request         | 3.6  |
|                                      |        | A9-Short Data Delivery        | 3.12 |
| IS-2000 Service Configuration Record | 4.2.20 | A9-Setup-A8                   | 3.1  |
|                                      |        | A9-AL Connected               | 3.8  |
|                                      |        | A9-Update-A8                  | 3.14 |
| Mobile Identity                      | 4.2.2  | A9-Setup A8                   | 3.1  |
|                                      |        | A9-Disconnect-A8              | 3.3  |
|                                      |        | A9-Release-A8                 | 3.4  |
|                                      |        | A9-BS Service Request         | 3.6  |
|                                      |        | A9-Short Data Delivery        | 3.12 |
|                                      |        | A9-Short Data Delivery Ack    | 3.13 |
|                                      |        | A9-Update-A8                  | 3.14 |
| Quality of Service Parameters        | 4.2.7  | A9-Setup-A8                   | 3.1  |
|                                      |        | A9-AL Connected               | 3.8  |
|                                      |        | A9-Update-A8                  | 3.14 |

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**Table 4.1.4-1 (Cont.) Cross Reference of Information Elements With Messages**

| Information Element |        | Used in These Messages     |      |
|---------------------|--------|----------------------------|------|
| Service Option      | 4.2.8  | A9-BS Service Request      | 3.6  |
|                     |        | A9-Setup-A8                | 3.1  |
|                     |        | A9-AL Connected            | 3.8  |
|                     |        | A9-Update-A8               | 3.14 |
| Software Version    | 4.2.21 | A9-Version Info            | 3.16 |
|                     |        | A9-Version Info Ack        | 3.17 |
| SR_ID               | 4.2.4  | A9-Short Data Delivery     | 3.12 |
|                     |        | A9-Short Data Delivery Ack | 3.13 |
| User Zone ID        | 4.2.6  | A9-Setup-A8                | 3.1  |
|                     |        | A9-AL Connected            | 3.8  |
|                     |        | A9-Update-A8               | 3.14 |

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## 4.2 Information Elements

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### 4.2.1 Active Connection Time in Seconds

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This element indicates the duration of traffic channel connection. It is coded as follows.

| 7                     | 6                      | 5 | 4 | 3 | 2 | 1 | 0     | Octet |
|-----------------------|------------------------|---|---|---|---|---|-------|-------|
| A9 Element Identifier |                        |   |   |   |   |   |       | 1     |
| Length                |                        |   |   |   |   |   |       | 2     |
| (MSB)                 | Active Connection Time |   |   |   |   |   |       | 3     |
| ...                   |                        |   |   |   |   |   |       | 4     |
| ...                   |                        |   |   |   |   |   |       | 5     |
| ...                   |                        |   |   |   |   |   | (LSB) | 6     |

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Length:

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This field shall be set to the length of this element in octets following the Length field. This field shall be set to 04H.

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Active Connection Time:

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This field indicates the duration of traffic channel established in seconds.

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## 4.2.2 Mobile Identity

The purpose of the mobile identity information element is to provide the mobile station Electronic Serial Number (ESN), the International Mobile Subscriber Identity (IMSI), or the Broadcast Address.

The International Mobile Subscriber Identifier (IMSI) does not exceed 15 digits and the ESN is a 32 bit field separated into a Manufacturer code, the Serial Number and a Reserved field. The Broadcast Address is used to deliver Short Messages to groups of subscribers and has the format specified in section 3.4.3.2 of [27] and is mapped to the Mobile Identity element as shown below.

This element is coded as specified in [1] – [6].

| 7                     | 6 | 5 | 4 | 3                  | 2                | 1 | 0 | Octet |
|-----------------------|---|---|---|--------------------|------------------|---|---|-------|
| A9 Element Identifier |   |   |   |                    |                  |   |   | 1     |
| Length                |   |   |   |                    |                  |   |   | 2     |
| Identity Digit 1      |   |   |   | Odd/even Indicator | Type of Identity |   |   | 3     |
| Identity Digit 3      |   |   |   | Identity Digit 2   |                  |   |   | 4     |
| ...                   |   |   |   |                    |                  |   |   | ...   |
| Identity Digit N+1    |   |   |   | Identity Digit N   |                  |   |   | k     |

The Length field is defined as the number of octets following the Length field.

The Type of Identity is defined as follows:

**Table 4.2.2-1 Mobile Identity - Type of Identity Coding**

| Binary Values | Meaning           |
|---------------|-------------------|
| 000           | No Identity Code  |
| 010           | Broadcast Address |
| 101           | ESN               |
| 110           | IMSI              |

The Odd/Even Indicator (octet 3; bit 3) field is set to '0' for an even number of digits and to '1' for an odd number of identity digits.

The identity digits (octet 3 etc.) are coded as follows:

The International Mobile Subscriber Identifier fields are coded using BCD coding format. If the number of identity digits is even then bits 4 to 7 of the last octet shall be filled with an end mark coded as '1111'.

The ESN is not separated into digits, and occupies octets 4-7 with the most significant bit in octet 4 bit 7. Identity Digit 1 in octet 3 is unused and coded as '0000'.

For Broadcast Address (type 010), the Mobile Identity is encoded as specified below based on [27].

| 7                     | 6       | 5          | 4 | 3                | 2 | 1 | 0     | Octet |
|-----------------------|---------|------------|---|------------------|---|---|-------|-------|
| A9 Element Identifier |         |            |   |                  |   |   |       | 1     |
| Length                |         |            |   |                  |   |   |       | 2     |
| Reserved              |         |            |   | Type of Identity |   |   |       | 3     |
| Priority              |         | Message ID |   |                  |   |   |       | 4     |
| Zone ID               |         |            |   |                  |   |   |       | 5     |
| (MSB)                 | Service |            |   |                  |   |   | (LSB) | 6     |
| Language              |         |            |   |                  |   |   |       | 8     |

- 1                   Length:
- 2                                   This field indicates the number of octets in this element following the
- 3                                   Length field.
- 4                   Type of Identity:
- 5                                   This field is defined as shown above.
- 6                   Priority:
- 7                                   This field indicates the priority level of this broadcast message to the
- 8                                   MS.
- 9                   Message ID:
- 10                                  This field contains a value used by the MS to distinguish between
- 11                                  different messages from the same broadcast service transmitted within
- 12                                  the time period established for broadcast duplicate detection in the
- 13                                  mobile station.
- 14                   Zone ID:
- 15                                  This field contains a value used by the MS to distinguish between
- 16                                  messages from the same broadcast service transmitted in different
- 17                                  geographic regions.
- 18                   Service:
- 19                                  This field contains the service category. The mobile station should
- 20                                  receive and process the broadcast message or page if the Service field
- 21                                  contains a service category that the mobile station has been configured
- 22                                  to receive.
- 23                   Language:
- 24                                  This field contains a value used by the MS to distinguish the language
- 25                                  used in the content of the broadcast message.
- 26

### 4.2.3 Cause

This element is used to indicate the reason for occurrence of a particular event and is coded as shown below.

| 7                     | 6           | 5 | 4 | 3 | 2 | 1 | 0 | Octet |
|-----------------------|-------------|---|---|---|---|---|---|-------|
| A9 Element Identifier |             |   |   |   |   |   |   | 1     |
| Length                |             |   |   |   |   |   |   | 2     |
| 0/1                   | Cause Value |   |   |   |   |   |   | 3     |

A Cause information element exists for multiple interfaces. The Cause values defined in this document are specific to the A9 interface.

The Length field is defined as the number of octets following the Length field.

The Cause Value field is a single octet field if the extension bit (bit 7) is set to '0'. If bit 7 of octet 3 is set to '1' then the Cause Value is a two octet field. If the value of the first octet of the cause field is '1XXX 0000' then the second octet is reserved for national applications, where 'XXX' indicates the Cause Class as indicated in the table below.

**Table 4.2.3-1 Cause Class Values**

| Binary Values | Meaning  |
|---------------|--|
| 000           | Normal Event                                   |
| 001           | Normal Event                                   |
| 010           | Resource Unavailable                           |
| 011           | Service or option not available                |
| 100           | Service or option not implemented              |
| 101           | Invalid message (e.g., parameter out of range) |
| 110           | Protocol error                                 |
| 111           | Interworking                                   |

1

Table 4.2.3-2 Cause Values

| 6   | 5 | 4 | 3 | 2 | 1 | 0 | Hex Value | Cause   |
|---|---|---|---|---|---|---|-----------|---|
| <b>Normal Event Class (000 xxxx and 001 xxxx)</b>         |   |   |   |   |   |   |           |   |
| 0   | 0 | 0 | 0 | 1 | 1 | 1 | 07        | OAM&P intervention                            |
| 6   | 5 | 4 | 3 | 2 | 1 | 0 | Hex Value | Cause   |
| 0   | 0 | 0 | 1 | 0 | 0 | 0 | 08        | MS busy                                       |
| 0   | 0 | 0 | 1 | 0 | 1 | 1 | 0B        | Handoff successful                            |
| 0   | 0 | 1 | 0 | 0 | 0 | 0 | 10        | Packet call going dormant                     |
| 0   | 0 | 1 | 0 | 0 | 0 | 1 | 11        | Service option not available                  |
| 0   | 0 | 1 | 0 | 0 | 1 | 1 | 13        | Successful operation                          |
| 0   | 0 | 1 | 0 | 1 | 0 | 0 | 14        | Normal call release                           |
| 0   | 0 | 1 | 0 | 1 | 1 | 0 | 16        | Initiate Re-activation of packet data call    |
| 0   | 0 | 1 | 1 | 0 | 0 | 1 | 19        | Power down from Dormant State                 |
| 0   | 0 | 1 | 1 | 0 | 1 | 0 | 1A        | Authentication Failure                        |
| 0   | 0 | 1 | 1 | 1 | 0 | 0 | 1C        | Update Accounting: Late Traffic Channel Setup |
| 0   | 0 | 1 | 1 | 1 | 1 | 0 | 1E        | Update Accounting: Parameter Change           |
| <b>Resource Unavailable Class (010 xxxx)</b>              |   |   |   |   |   |   |           |   |
| 0   | 1 | 0 | 0 | 0 | 0 | 0 | 20        | Equipment failure                             |
| <b>Service or Option Not Available Class (011 xxxx)</b>   |   |   |   |   |   |   |           |   |
| 0   | 1 | 1 | 0 | 0 | 1 | 0 | 32        | PCF resources not available                   |
| <b>Service or Option Not Implemented Class (100 xxxx)</b> |   |   |   |   |   |   |           |   |
| <b>Invalid Message Class (101 xxxx)</b>                   |   |   |   |   |   |   |           |   |
| <b>Protocol Error (110 xxxx)</b>                          |   |   |   |   |   |   |           |   |
| <b>Interworking (111 xxxx)</b>                            |   |   |   |   |   |   |           |   |
| 1   | 1 | 1 | 1 | 0 | 0 | 1 | 79        | PDSN resources are not available              |
| 1   | 1 | 1 | 1 | 0 | 1 | 0 | 7A        | Data ready to send                            |
| All other values  |   |   |   |   |   |   |           | Reserved for future use.                      |

2

3

#### 4.2.4 SR\_ID

---

This information element identifies the service reference identifier for a particular service instance.

| 7                     | 6 | 5 | 4 | 3             | 2 | 1 | 0 | Octet |
|-----------------------|---|---|---|---------------|---|---|---|-------|
| A9 Element Identifier |   |   |   |               |   |   |   | 1     |
| Length                |   |   |   |               |   |   |   | 2     |
| Reserved              |   |   |   | IS-2000 SR_ID |   |   |   | 3     |

Length:

This field shall be set to the length of this element in octets following the Length field.

IS-2000 SR\_ID:

This field contains the service reference identifier value as defined in ([1] to [6]). This version of the standard only supports a maximum of two service instances.

**4.2.5 Current PDSN Address**

When sent from a PCF to a BS, this element contains an IPv4 IP Address for the A10/A11 interface of the PDSN that terminates the A10 connection corresponding to the just-established A8 connection.

When sent from a target BS to a target PCF, this element contains an IPv4 IP Address for the source PDSN during a Fast Handoff.

| 7                     | 6     | 5 | 4 | 3 | 2 | 1 | 0     | Octet |
|-----------------------|-------|---|---|---|---|---|-------|-------|
| A9 Element Identifier |       |   |   |   |   |   |       | 1     |
| Length                |       |   |   |   |   |   |       | 2     |
| (MSB)                 | ----- |   |   |   |   |   |       | 3     |
| Current PDSN Address  |       |   |   |   |   |   |       | 4     |
| -----                 |       |   |   |   |   |   |       | 5     |
|                       |       |   |   |   |   |   | (LSB) | 6     |

Length:

This field contains the number of octets in this element following this field as a binary number.

Current PDSN Address:

This field contains an IPv4 address for the A10/A11 interface of a PDSN.

1 **4.2.6 USER Zone ID**

2 This element uniquely identifies a particular User Zone.

| 7                     | 6    | 5 | 4 | 3 | 2 | 1 | 0     | Octet |
|-----------------------|------|---|---|---|---|---|-------|-------|
| A9 Element Identifier |      |   |   |   |   |   |       | 1     |
| Length                |      |   |   |   |   |   |       | 2     |
| (MSB)                 | UZID |   |   |   |   |   | (LSB) | 3     |
|                       |      |   |   |   |   |   |       | 4     |

3 Length:

4 The length field contains the binary value that indicates the number of  
 5 octets in the element following the Length field.

6 UZID:

7 This field contains a User Zone ID value as sent by the MSC or MS.  
 8 The MSC is responsible for any mapping of this 16-bit value to the 24-  
 9 bit value defined in [18].

10

**4.2.7 Quality of Service Parameters**

This element identifies the Quality of Service for a given packet data service. In this version of this standard the only information carried is non-assured mode packet priority.

| 7                     | 6 | 5 | 4 | 3                                | 2 | 1 | 0 | Octet |
|-----------------------|---|---|---|----------------------------------|---|---|---|-------|
| A9 Element Identifier |   |   |   |                                  |   |   |   | 1     |
| Length                |   |   |   |                                  |   |   |   | 2     |
| Reserved              |   |   |   | Non-Assured Mode Packet Priority |   |   |   | 3     |

Element Identifier:

This information element is used on multiple interfaces. When the information element is included in a message that is sent on the A1 or A9 interface, the Element Identifier field is coded as 07H. When the information element is included in a message sent on the A7 interface, the Element Identifier field is coded as 0FH.

Length:

This field indicates the number of octets in this element following the Length field.

Reserved:

This field shall be set to '0000' and ignored.

Non-Assured Mode Packet Priority:

This field indicates the priority of a non-assured packet data service as a binary value. Value '0000' is the lowest priority. Value '1101' is the highest priority. Values '1110' and '1111' are reserved.

## 4.2.8 Service Option

This element indicates the service option requested by the MS, or by the network. It is coded as follows:

| 7                     | 6              | 5 | 4 | 3 | 2 | 1 | 0     | Octet |   |
|-----------------------|----------------|---|---|---|---|---|-------|-------|---|
| A9 Element Identifier |                |   |   |   |   |   |       | 1     |   |
| (MSB)                 | Service Option |   |   |   |   |   |       |       | 2 |
|                       |                |   |   |   |   |   | (LSB) | 3     |   |

For signaling type *TIA/EIA/IS-2000*, the Service Option field in octets 2 and 3 is coded as defined in [31].

The service options supported are given in Table 4.2.8-1.

**Table 4.2.8-1 Service Option Values**

| Service Option Value (hex) | Description                 |
|----------------------------|-----------------------------|
| 0021H                      | (3G High Speed Packet Data) |

## 4.2.9 ADDS User Part

This element contains the user information portion of an ADDS message. That is, it carries the application data message.

| 7                        | 6 | 5 | 4 | 3 | 2 | 1 | 0 | Octet |
|--------------------------|---|---|---|---|---|---|---|-------|
| A9 Element Identifier    |   |   |   |   |   |   |   | 1     |
| Length                   |   |   |   |   |   |   |   | 2     |
| Data Burst Type          |   |   |   |   |   |   |   | 3     |
| Application Data Message |   |   |   |   |   |   |   | 4-n   |

The Length field is defined as the number of octets following the Length field and has a value greater than zero.

The Data Burst Type field is coded as follows:

For CDMA: the 6-bit Data Burst Type defined in ([1] to [6]) is contained in bits 5 through 0, with bits 6 and 7 set to zero.

The Application Data Message field has variable length and is encoded as follows:

For Short Data Burst, the Application Data Message is the SDB as specified in [28]. This data is not included for mobile originated short data bursts.

## 4.2.10 Call Connection Reference

This information element contains a globally unique identification for a call connection.

| 7   | 6                               | 5 | 4 | 3 | 2 | 1 | 0     | Octet |
|---|---------------------------------|---|---|---|---|---|-------|-------|
| A9 Element Identifier                       |                                 |   |   |   |   |   |       | 1     |
| Length                                      |                                 |   |   |   |   |   |       | 2     |
| (MSB)                                       | Market ID                       |   |   |   |   |   |       | 3     |
| Market ID (continued)                       |                                 |   |   |   |   |   | (LSB) | 4     |
| (MSB)                                       | Generating Entity ID            |   |   |   |   |   |       | 5     |
| Generating Entity ID (continued)            |                                 |   |   |   |   |   | (LSB) | 6     |
| (MSB)                                       | Call Connection Reference Value |   |   |   |   |   |       | 7     |
| Call Connection Reference Value (continued) |                                 |   |   |   |   |   |       | 8     |
| Call Connection Reference Value (continued) |                                 |   |   |   |   |   |       | 9     |
| Call Connection Reference Value (continued) |                                 |   |   |   |   |   | (LSB) | 10    |

### Length:

The Length field contains the number of octets in this element following the Length field.

### Market ID:

This field represents a unique market ID that is specified by the service provider (refer to [30]).

### Generating Entity ID:

This two octet field represents a unique code assigned by the operator to the entity that generates this Call Connection Reference value.

### Call Connection Reference Value:

This four octet field may contain any value. It is assigned by the generating entity whose responsibility it is to guarantee its uniqueness.

**4.2.11 Correlation ID**

This information element is used to correlate request and response messages.

| 7                     | 6 | 5 | 4 | 3 | 2 | 1 | 0     | Octet |
|-----------------------|---|---|---|---|---|---|-------|-------|
| A9 Element Identifier |   |   |   |   |   |   |       | 1     |
| Length                |   |   |   |   |   |   |       | 2     |
| (MSB)                 |   |   |   |   |   |   |       | 3     |
| Correlation Value     |   |   |   |   |   |   |       | 3     |
|                       |   |   |   |   |   |   |       | 5     |
|                       |   |   |   |   |   |   | (LSB) | 6     |

Length:

The Length field contains the number of octets in this element following the Length field and is set to a value of 4.

Correlation Value:

This field contains a value that allows the network entity to correlate a request-response pair of messages. The value is a manufacturer concern. In this revision of this standard, this value shall be exactly 4 octets in length.

1 **4.2.12 Anchor P-P Address**

2 This element contains the IPv4 address for the P-P interface of the anchor PDSN for Fast  
 3 Handoff.

| 7                     | 6     | 5 | 4 | 3 | 2 | 1 | 0     | Octet |
|-----------------------|-------|---|---|---|---|---|-------|-------|
| A9 Element Identifier |       |   |   |   |   |   |       | 1     |
| Length                |       |   |   |   |   |   |       | 2     |
| (MSB)                 | ----- |   |   |   |   |   |       | 3     |
| Anchor P-P Address    |       |   |   |   |   |   |       | 4     |
| -----                 |       |   |   |   |   |   |       | 5     |
| -----                 |       |   |   |   |   |   | (LSB) | 6     |

4 Length:  
 5 This field contains the number of octets in this element following this  
 6 field as a binary number.  
 7 Anchor PDSN Address:  
 8 This field contains an IPv4 address of the P-P interface for an anchor PDSN.

9  
 10

### 4.2.13 A9 Message Type

The A9 Message Type element is used to indicate the type of a message on the A9 interface.

| A9 Message Name        | A9 Message Type | Section Reference |
|------------------------|-----------------|-------------------|
| A9-Setup-A8            | 01H             | 3.1               |
| A9-Connect-A8          | 02H             | 3.2               |
| A9-Disconnect-A8       | 03H             | 3.3               |
| A9-Release-A8          | 04H             | 3.4               |
| A9-Release-A8 Complete | 05H             | 3.5               |
| A9-BS Service Request  | 06H             | 3.6               |
| A9-BS Service Response | 07H             | 3.7               |
| A9-AL Connected        | 08H             | 3.8               |
| A9-AL Connected Ack    | 09H             | 3.9               |
| A9-AL Disconnected     | 0AH             | 3.10              |
| A9-AL Disconnected Ack | 0BH             | 3.11              |
| A9-Short Data Delivery | 0CH             | 3.12              |
| A9-Short Data Ack      | 0DH             | 3.13              |
| A9-Update-A8           | 0EH             | 3.14              |
| A9-Update-A8-Ack       | 0FH             | 3.15              |
| A9-Version Info        | 10H             | 3.16              |
| A9-Version Info Ack    | 11H             | 3.17              |

1 **4.2.14 CON\_REF**

---

2 This information element identifies connection instance between the MS and the source  
 3 BS.

| 7                     | 6 | 5 | 4 | 3 | 2 | 1 | 0 | Octet |
|-----------------------|---|---|---|---|---|---|---|-------|
| A9 Element Identifier |   |   |   |   |   |   |   | 1     |
| Length                |   |   |   |   |   |   |   | 2     |
| IS-2000 CON_REF       |   |   |   |   |   |   |   | 3     |

4 Length:  
 5 This field shall be set to the length of this element in octets following  
 6 the Length field.

7 IS-2000 CON\_REF:  
 8 This field contains the connection reference value defined in [1] to [6].  
 9

**4.2.15 A9 Cell Identifier**

This element uniquely identifies a particular cell and is of variable length depending on how the cell is identified. The fields of this element are shown below:

| 7                                 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | Octet |
|-----------------------------------|---|---|---|---|---|---|---|-------|
| A9 Element Identifier             |   |   |   |   |   |   |   | 1     |
| Length                            |   |   |   |   |   |   |   | 2     |
| Cell Identification Discriminator |   |   |   |   |   |   |   | 3     |
| MSCID                             |   |   |   |   |   |   |   | 4     |
| MSCID continued                   |   |   |   |   |   |   |   | 5     |
| MSCID continued                   |   |   |   |   |   |   |   | 6     |
| CI value                          |   |   |   |   |   |   |   | 7     |
| CI value continued                |   |   |   |   |   |   |   | 8     |

Length:

This field shall be set to the length of this element in octets following the Length field.

Cell Identification Discriminator:

This field shall be set to 7.

**MSCID, MSC Identifier (octets 4 through 6):**

The MSCID is coded as defined in [18], Section 4.5.2.82.

MSCID is 3 octets long where the first two octets (octets 4 and 5) represent Market ID and the last octet represents the Switch Number.

In the MSCID field, bit 7 of octet 4 is the most significant bit and bit 0 of octet 5 is the least significant bit of the Market ID field.

In the MSCID field bit 7 of octet 6 is the most significant bit of the Switch Number field.

**CI, Cell Identity value (octets 7 and 8):**

In the CI value field bit 7 of octet 7 is the most significant bit and bit 0 of octet 8 is the least significant bit. Bits 3 to 0 of octet 8 contain the sector number (OH = omni).

**4.2.16 A8\_Traffic\_ID**

This information element identifies the connection used by the MS for packet data service.

| 7                           | 6             | 5 | 4 | 3 | 2 | 1 | 0     | Octet |
|-----------------------------|---------------|---|---|---|---|---|-------|-------|
| A9 Element Identifier       |               |   |   |   |   |   |       | 1     |
| Length                      |               |   |   |   |   |   |       | 2     |
| A8 transport protocol stack |               |   |   |   |   |   |       | 3     |
| (MSB)                       | Protocol Type |   |   |   |   |   | (LSB) | 4     |
|                             |               |   |   |   |   |   |       | 5     |
| (MSB)                       | Key           |   |   |   |   |   | (LSB) | 6     |
|                             |               |   |   |   |   |   |       | 7     |
|                             |               |   |   |   |   |   |       | 8     |
|                             |               |   |   |   |   |   |       | 9     |
| Address Type                |               |   |   |   |   |   |       | 10    |
| (MSB)                       | IP Address    |   |   |   |   |   | (LSB) | 11    |
|                             |               |   |   |   |   |   |       | ...   |
|                             |               |   |   |   |   |   |       | k     |

Length:

This field shall be set to the length of this element in octets following the Length field.

A8 transport protocol stack:

This field is used to identify the A8 transport protocol stack to be used for the A8 connection.

**Table 4.2.16-1 A8\_Traffic\_ID - A8 Transport Protocol Stack**

| Values     | Meaning  |
|------------|----------|
| 01H        | GRE/IP   |
| All Others | Reserved |

Protocol Type:

This field is used to indicate the protocol type to be tunneled across the A8 interface. It is same as the Protocol Type field in the GRE header. This field is set to 0x88 81H (Unstructured Byte Stream).

Key:

This is a four octet field. This field is used to indicate the A8 connection identification. It is same as the Key field in the GRE header.

Address Type:

This field indicates the type and format of the IP Address that follows.

1

**Table 4.2.16-2 A8\_Traffic\_ID - Address Type**

| <b>Value</b>              | <b>Address Type</b>    | <b>Length of IP Address</b> |
|---------------------------|------------------------|-----------------------------|
| 01H                       | Internet Protocol IPv4 | 4 octets                    |
| 02H                       | Internet Protocol IPv6 | variable                    |
| All other values reserved |                        |                             |

2

IP Address:

3

4

5

6

7

8

This field has a variable length that is dependent on the Type field. This field is used to indicate the IP address of the A8 bearer port on the sending entity. That is, when the BS sends the A9-Setup-A8 message containing this element, this field contains the IP address at the BS where the A8 user traffic connection terminates.

## 4.2.17 A9 Indicators

This information element indicates whether an A9-Setup-A8 message is being sent by the source BS as a result of an initial connection, or by the target BS as a result of a handoff operation.

| 7                     | 6 | 5 | 4 | 3         | 2           | 1                    | 0                 | Octet |
|-----------------------|---|---|---|-----------|-------------|----------------------|-------------------|-------|
| A9 Element Identifier |   |   |   |           |             |                      |                   | 1     |
| Length                |   |   |   |           |             |                      |                   | 2     |
| Reserved              |   |   |   | CCPD Mode | CCPD Device | Data Ready Indicator | Handoff Indicator | 3     |

Length:

This field shall be set to the length of this element in octets following the Length field.

Handoff indicator:

This field indicates whether or not a handoff was performed. If this field is set '0', the A9-Setup-A8 message indicates a normal call setup. If this field is set '1', the Setup message indicates a Hard Handoff is to be performed and it is not necessary to establish the A10/A11 connection immediately. This field is set to '0' for Dormant handoff. This field is set to '0' in the case of Fast Handoff because an A10 connection needs to be setup immediately. Refer to [13].

Data Ready Indicator:

This field indicates whether there is data ready to be sent from the mobile to the network. It reflects the value of the DRS bit of the air interface. If this field is set to '0', it indicates that data is not ready to be sent and the A9-Setup-A8 message is reporting a mobility event. Otherwise (set to '1') it indicates that data is ready to be sent.

CCPD Device:

This field indicates if the call is for a CCPD device. If the call is for a CCPD device, this field shall be set to '1'. For all other mobiles, it shall be set to '0'. When this bit is set, the PCF shall send any packet data arriving from the PDSN for a CCPD device in SDB format on the A9 signaling channel. The PCF shall not buffer the data, nor shall an A9-Short Data Ack message be sent from the BS to the PCF.

CCPD Mode:

This field indicates that a mobile has requested CCPD Mode. The PCF is not required to allocate an A8 connection when this bit is set. Any signalling or data exchanged between the PCF and BS is sent over the A9 signalling channel.

## 4.2.18 Data Count

---

This element contains a count the number of bytes to be transmitted.

| 7                     | 6 | 5 | 4 | 3 | 2 | 1 | 0 | Octet |
|-----------------------|---|---|---|---|---|---|---|-------|
| A9 Element Identifier |   |   |   |   |   |   |   | 1     |
| Length                |   |   |   |   |   |   |   | 2     |
| Count - Octet 1       |   |   |   |   |   |   |   | 3     |
| Count - Octet 2       |   |   |   |   |   |   |   | 4     |

Length:

This field indicates the number of octets in this element following the Length field, and shall be set to 02H.

Count:

This element indicates the number of bytes remaining in the PCF. The value FF FFH means that the number of bytes remaining is greater than or equal to FF FFH bytes (65536 bytes).

## 4.2.19 Access Network Identifiers

The Access Network Identifiers (PZID, SID and NID) uniquely identify the PCF and are used by the PDSN to determine if it currently owns the call. If so, the PDSN does not need to send agent advertisements. If not, then the PDSN needs to trigger an MIP Registration Request so the Foreign Agent / Home Agent tunnel is setup properly.

| 7                     | 6     | 5   | 4 | 3 | 2 | 1 | 0     | Octet |   |
|-----------------------|-------|-----|---|---|---|---|-------|-------|---|
| A9 Element Identifier |       |     |   |   |   |   |       | 1     |   |
| Length                |       |     |   |   |   |   |       | 2     |   |
| Reserved              | (MSB) | SID |   |   |   |   |       |       | 3 |
|                       |       |     |   |   |   |   | (LSB) | 4     |   |
| (MSB)                 | NID   |     |   |   |   |   |       | 5     |   |
|                       |       |     |   |   |   |   | (LSB) | 6     |   |
| PZID                  |       |     |   |   |   |   |       | 7     |   |

**Length:**

This field contains the number of octets in this element following this field as a binary number.

**SID:**

This two octet field is coded to the value that uniquely identifies the cellular or PCS system.

**NID:**

This two octet field is coded to the value that uniquely identifies the network within a cellular or PCS system.

**PZID:**

This two octet field is coded to the value that uniquely identifies the Packet Control Function (PCF) coverage area within a particular SID/NID area. The combined SID/NID/PZID triplet is unique to a PCF.

**4.2.20 IS-2000 Service Configuration Record**

This information element contains the service configuration record as defined in [5].

| 7   | 6                            | 5                          | 4                          | 3                            | 2                          | 1                           | 0                          | Octet |
|---|------------------------------|----------------------------|----------------------------|------------------------------|----------------------------|-----------------------------|----------------------------|-------|
| A9 Element Identifier                               |                              |                            |                            |                              |                            |                             |                            | 1     |
| Bit-Exact Length – Octet Count                      |                              |                            |                            |                              |                            |                             |                            | 2     |
| Reserved  |                              |                            |                            | Bit-Exact Length – Fill Bits |                            |                             |                            | 3     |
| (MSB)   |                              |                            |                            |                              |                            |                             |                            | 4     |
| <i>IS-2000</i> Service Configuration Record Content |                              |                            |                            |                              |                            |                             |                            | ...   |
|   | Seventh Fill Bit – if needed | Sixth Fill Bit – if needed | Fifth Fill Bit – if needed | Fourth Fill Bit – if needed  | Third Fill Bit – if needed | Second Fill Bit – if needed | First Fill Bit – if needed | k     |

Element Identifier:

This information element is used on multiple interfaces. When the information element is included in a message that is sent on the A9 interface, the Element Identifier field is coded as 0EH. When the information element is included in a message sent on the A7 interface, the Element Identifier field is coded as 10H.

Bit-Exact Length – Octet Count:

This field contains the total number of octets in this element following the Length field represented as a binary value.

Bit-Exact Length – Fill Bits:

This field contains a binary value indicating the number of fill bits contained in the last octet of this element. If this field contains a non-zero value, the indicated number of fill bits are set to '0' and occupy the low order bit positions of the last octet of this element.

*IS-2000* Service Configuration Record Content:

This field contains a Service Configuration Record coded according to [5]. The value begins in the high order bit position of octet 4 of this element and extends into the last octet of this element. Bit positions in the last octet that are not used, if any, are considered fill bits, are set to '0', and occupy the low order bit positions of the last octet.

## 4.2.21 Software Version

This element provides software version information about the sub-system originating the message. Its definition is a BS, PCF, and MSC manufacturer concern.

| 7   | 6 | 5 | 4 | 3 | 2 | 1 | 0 | Octet |
|---|---|---|---|---|---|---|---|-------|
| A9 Element Identifier                     |   |   |   |   |   |   |   | 1     |
| Length                                    |   |   |   |   |   |   |   | 2     |
| IOS Major Revision Level (X)              |   |   |   |   |   |   |   | 3     |
| IOS Minor Revision Level (Y)              |   |   |   |   |   |   |   | 4     |
| IOS Point Release Level (Z)               |   |   |   |   |   |   |   | 5     |
| Manufacturer/Carrier Software Information |   |   |   |   |   |   |   | 6-n   |

Each version of this standard is published with a version number in the form X.Y.Z. These three values shall be placed in octets 3, 4, and 5 respectively as binary values.

Each separate software load from a manufacturer shall have some software load identity. In addition, the carrier may require the exchange of specific information between entities in their network. This information shall be placed in octets 6-n in ASCII format as agreed between the carrier and the manufacturer.

1 **4.2.22 Anchor PDSN IP Address**

2 This element contains the IPv4 address for the A10/A11 interface of the Anchor PDSN  
 3 for Fast Handoff.

| 7                     | 6     | 5 | 4 | 3 | 2 | 1 | 0     | Octet |
|-----------------------|-------|---|---|---|---|---|-------|-------|
| A9 Element Identifier |       |   |   |   |   |   |       | 1     |
| Length                |       |   |   |   |   |   |       | 2     |
| (MSB)                 | ..... |   |   |   |   |   |       | 3     |
| Anchor PDSN Address   |       |   |   |   |   |   |       | 4     |
| .....                 |       |   |   |   |   |   |       | 5     |
| .....                 |       |   |   |   |   |   | (LSB) | 6     |

4 Length:  
 5 This field contains the number of octets in this element following this  
 6 field as a binary number.  
 7 Anchor PDSN Address:  
 8 This field contains an IPv4 address of the A10/A11 interface for an  
 9 anchor PDSN.  
 10  
 11

## 5.0 Timer Definitions

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### 5.1 Timer Values

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The following table is in units of seconds unless otherwise noted.

**Table 5.1-1 Timer Values and Ranges Sorted by Name**

| Timer Name            | Default Value (seconds) | Range of Values (seconds) | Granularity (seconds) | Section Reference |
|-----------------------|-------------------------|---------------------------|-----------------------|-------------------|
| T <sub>A8-Setup</sub> | 4                       | 0-99                      | 1                     | 5.2.1             |
| T <sub>alc9</sub>     | 0.5                     | 0 – 1.0                   | 0.1                   | 5.2.4             |
| T <sub>ald9</sub>     | 0.5                     | 0 – 1.0                   | 0.1                   | 5.2.7             |
| T <sub>aldak</sub>    | 1                       | 0 – 5                     | 0.1                   | 5.2.10            |
| T <sub>bsreq9</sub>   | 1.5                     | 0 – 5                     | 0.1                   | 5.2.6             |
| T <sub>discon9</sub>  | 1                       | 0-5                       | 0.1                   | 5.2.2             |
| T <sub>rel9</sub>     | 1                       | 0-5                       | 0.1                   | 5.2.3             |
| T <sub>sdd9</sub>     | 1.5                     | 0-5                       | 0.1                   | 5.2.8             |
| T <sub>upd9</sub>     | 1                       | 0-5                       | 0.1                   | 5.2.9             |
| T <sub>wait9</sub>    | Refer to section 5.2.5  |                           |                       | 5.2.5             |
| T <sub>ver9</sub>     | 1                       | 0-5                       | 0.1                   | 5.2.11            |

### 5.2 Timer Definitions

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#### 5.2.1 T<sub>A8-setup</sub>

---

This is a BS timer. The timer is started when an A9-Setup-A8 message is sent and stopped when an A9-Connect-A8 message is received.

#### 5.2.2 T<sub>discon9</sub>

---

This is a PCF timer. The timer is started when an A9-Disconnect-A8 message is sent and stopped when an A9-Release-A8 message is received.

#### 5.2.3 T<sub>rel9</sub>

---

This is a BS timer. The timer is started when an A9-Release-A8 message is sent and stopped when an A9-Release-A8 Complete message is received.

- 1     **5.2.4**            **T<sub>alc9</sub>**  
2                            This is a BS timer. The timer is started when an A9-AL Connected message is sent and  
3                            stopped when an A9-AL Connected Ack message is received.
- 
- 4     **5.2.5**            **T<sub>waitho9</sub>**  
5                            This is a PCF timer. The timer is started when an A9-Connect-A8 message is sent and  
6                            stopped when an A9-AL Connected message is received. The value of this timer shall be  
7                            greater than that of the air interface timer T<sub>waitho</sub>. Refer to section 6.2.1.17 [14].
- 
- 8     **5.2.6**            **T<sub>bsreq9</sub>**  
9                            This is a PCF timer. The timer is started when an A9-BS Service Request message is sent  
10                           and stopped when an A9-BS Service Response message is received.
- 
- 11    **5.2.7**            **T<sub>ald9</sub>**  
12                           This is a BS timer. The timer is started when an A9-AL Disconnected message is sent  
13                           and stopped when an A9-AL Disconnected Ack message is received.
- 
- 14    **5.2.8**            **T<sub>sdd9</sub>**  
15                           This PCF timer is started after the A9-Short Data Delivery message is sent to the BS and  
16                           stopped when the A9-Short Data Ack message is received.
- 
- 17    **5.2.9**            **T<sub>upd9</sub>**  
18                           The BS timer is started after the A9-Update-A8 message is sent to the PCF and stopped  
19                           when the A9-Update-A8 Ack message is received.
- 
- 20    **5.2.10**           **T<sub>aldak</sub>**  
21                           This is a PCF timer. The timer is started when an A9-AL Disconnected Ack message is  
22                           sent and stopped when an A9-Release A8 message or A9-AL Connected message is  
23                           received.
- 
- 24    **5.2.11**           **T<sub>vers9</sub>**  
25                           This is a BS and PCF timer. The timer is started when an A9-Version Info message is  
26                           sent and stopped when an A9-Version Info Ack message is received.